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CANADA'S GRAIN TRADE.

IMPORTANT AMERICAN AND CANADIAN INFLUENCES AT WORK FOR THE DEVELOPMENT OF TRAFFIC BY WAY OF ENLARGED ST. LAWRENCE CANALS—FORMATION OF THE CANADIAN INLAND TRANSPORTATION CO.

A party of vessel owners from Cleveland and Buffalo, headed by W. J. Conners of the latter city, have for some time past been trying to bring about arrangements for the construction of large grain elevators and other terminal facilities at Montreal. It is understood that their plans also contemplate the establishment of extensive vessel connections, with the whole scheme based on the advantages for the export of grain, flour, etc., that are to be offered by the Canadian canal route upon the completion of improvements next spring in the lower St. Lawrence. The American capitalists who have taken up this scheme are undoubtedly cooperating with men of influence in Canada, who have had an eye to the possibilities of the Manitoba wheat district, especially in connection with transportation advantages that are expected from Canada's enlarged waterways. The construction of ships suited to the new canals has repeatedly been talked of in Canada—a long time previous to the elevator project being taken up at Montreal— but the first move in this direction is found in the formation of the Canadian Inland Transportation Co., a corporation of $4,000,000 capital, with which the names of Geo. H. Bertram and other principals of the Bertram Engine Works of Toronto (a ship building concern) are prominently connected. Probably there is some connection between the Montreal project and the formation of the transportation company, but however this may be it is evident that important influences are now at work in the matter of Canada's grain export trade.

It is announced from Ottawa that the object of the new transportation company is the establishment of a line of modern steel steamers of Welland canal size, whose entrance into the lake trade is expected to not only secure a considerable portion of the profits from the carriage of grain which is now moved almost exclusively in American bottoms, but to divert to Montreal and the Canadian water route much of the grain which now finds its outlet via Buffalo and the Erie canal. The limitations of the former status of affairs are obvious. It was impossible for an American vessel to load grain at Fort William for Montreal or any other Canadian port, just as it is impossible for a Canadian vessel to carry grain from Chicago to Buffalo. Protective laws, similar in character, cover the coasting trade of both countries. The American fleet is large, while the Canadian fleet has been very small. A Manitoba grain crop of constantly increasing dimensions has had to be cared for, and as the only solution of the case much of this grain which was shipped by water went to Buffalo or other American ports.

It is understood that this newly incorporated Canadian company, which may be the forerunner of others, is expecting to receive substantial aid from the Canadian government. The Dominion has spent and is spending immense sums for canal improvements. To reap full benefit from this expenditure Canada must develop as speedily as possible the nucleus for a merchant marine of greater proportions than now exsists on the great lakes. Government aid in the form of a subsidy will serve to develop this quickly, it is claimed, and will at the same time serve to develop the ship building industry in Canada—a desire that seems to be very near the hearts of the most progressive citizens of the Dominion. This explains the activity of the ship builders and their associates in the new company. At the Bertram works in Toronto, in all probability will be built the fleet of ten steel carriers projected by the company, if the scheme is successful. It is said, in fact, that two of the steamers are already under way. Officials of the Bertram company have within the past few months visited American cities on the great lakes and have made a careful study of vessels of a kind best suited to this through service from the northwest to Montreal. The boats of the new company will, of course, be constructed with a view to the limitations of the canal locks, the dimensions given in dispatches from Ottawa being 276 feet length and 43 feet beam. From the same authority comes the estimate that the vessels will have a capacity of 78,000 bushels of wheat on the 14 foot depth to which the canals are now being deepened, or 108,000 bushels on a depth of 18 feet, the latter in anticipation of a project which is being agitated, but the consummation of which is, of course, some distance off. The new company is understood also to be figuring upon carrying some ore from Lake Superior ports to the furnace at Hamilton, and to the proposed enlarged steel and ship building plant at Toronto, but this latter scheme is, of course, also a matter of the future.

The Marine Review correspondent at Ottawa writing of this matter says: "There is no connection between the new Toronto transportation company and the Montreal scheme advocated by Messrs. W. J. Conners, Harvey D. Goulder and others of Cleveland and Buffalo. Those interested in the transportation company are William Christie, J. K. Osborne and Geo. H. Bertram, M. P., of Toronto; Alex Lumsden, M. P. P. and John McRae of Ottawa, and Senator Forget of Montreal. The company proposes also to build an elevator at Montreal if they can succeed in making proper arrangements for that purpose. In this connection it may be mentioned that there is little probability of any concession being made to the Cleveland-Buffalo syndicate that is desirous of investing capital in a Montreal elevator. There is a widespread impression that such a syndicate might have too tender a regard for the commercial interests of Buffalo. The American capitalists have also to reckon with the powerful hostility of the Canadian Pacific Railway, which proposes to retain in its own hands as much as possible of the grain business of this country. I doubt if Mr. Goulder and his clients appreciate the difficulties they will have to meet in securing any concessions, even if they admit Canadian capitalists, which they have declared their willingness to do. Sir William Van Horne, president of the Canadian Pacific, has come out in an interview declaring that Canadians can attend to the matter themselves without American interference. That utterance, being interpreted, means of course that the Canadian Pacific is trying to gobble up the elevator business at Montreal. There is also talk of having such elevators built by the government and operated by the public, and there is a counter proposition to have them built by a private company which would receive a bonus and the government would regulate charges. Such private company is not yet formed, but men who have the money are ready to go into it and their present apparent slowness is dictated by a desire to get as much as possible out of the government. The government has not yet given any definite intimation of what it is prepared to do, but the minister of public works, Mr. Tarte, favors the idea of public ownership.

"In addition to carrying wheat the Inland Transportation Co. expects to do some business in carrying ore to a blast furnace which is to be erected in Toronto with a capacity of 200 tons of iron per day. The company for the erection of the furnace has already been formed and will, it is said, apply for a charter within a few days. It will have a capital of two millions, a large part of which, it is understood, will be furnished by Americans. A welcome and, for Canada, a rather unusual feature is that no government or municipal bonus of any kind will be asked by the furnace company. The Rainy River railroad will be completed in a few months and it is claimed there will then be no difficulty in obtaining the necessary red hematite ore to mix with the ores of northern Ontario."

HILL IN THE ORE TRADE.

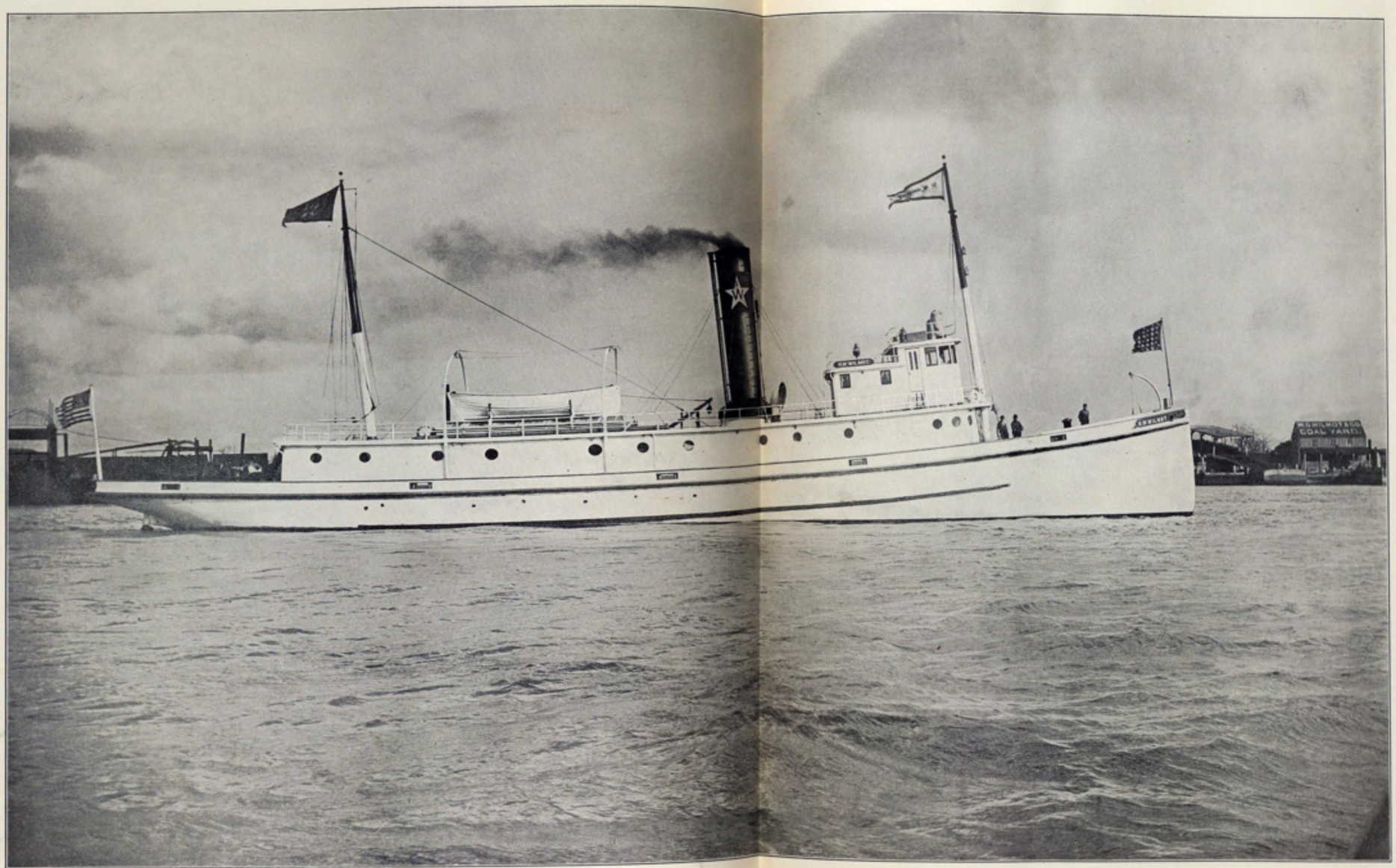
CLOSE RELATIONS WITH THE AMERICAN STEEL & WIRE CO.—FURTHER EVIDENCE OF A CONTROL OF TRANSPORTATION BY THE BIG INDUSTRIAL ORGANIZATIONS.

When it was announced, some time ago, that the American Steel & Wire Co. had secured control of five steel modern freighters of the Zenith Transit Co., or Wolvin fleet, no reference was made to James J. Hill or the Great Northern Railway in the deal. It was known that Mr. Hill had been and is still figuring with Mr. A. B. Wolvin to take up the establishment of a line of steamers on the Pacific, between Puget sound and the Orient, but it has only lately been learned that he is also in close relations with the American Steel & Wire Co., and was not only instigative in having the Wolvin fleet go to that interest, but will probably soon stand in the same relation to the American Steel & Wire Co. that John D. Rockefeller holds with the Carnegie Steel Co. In other words Mr. Hill, or the Great Northern Ry. Co., seems to have joined hands with the steel and wire combination in the work of developing railway, iron mining and dock interests in Minnesota, and it will probably be found that before another year has passed the American Steel & Wire Co. will have established, through these relations with the Great Northern, a position similar to that of the Federal Steel Co. and the Carnegie company, that of controlling a large part of the steel industry from the ore in the mines down to the manufactured product.

The Eastern Railroad of Minnesota, a part of the Great Northern system, is already in possession of dock property on Allouez bay, near Duluth, and will handle quite a large amount of ore this season, but the scheme above outlined will, of course, require considerable time for development, not only as regards the extension of the Eastern Minnesota to other mines, but also in acquiring additional dock facilities at the head of the lakes. It is understood also that the ships purchased by the steel and wire company will not be available for the service of that company until very late in the present season. There is every indication, however, of this new and important move in the steel industry working out very shortly along the lines here stated, and thus the vessel interests are met with further evidence of the eventual control of the transportation of ore from mines to furnaces by a few big corporations.

Everything points now to a general opening of navigation within the next few days. It is expected that vessels will be loading ore at Escanaba about the 25th inst. With pig iron being turned out just now at a rate of nearly 14,000,000 tons annually, and with the manufacturers of iron and steel absolutely assured of an immense business for the full year, there is no doubt regarding unusual activity in lake business, certainly for the present season. Coal shippers have secured no vessels on season contracts and have practically given up effort in that direction. They are paying 30 cents a ton freight—an advance of 10 cents over the opening last year—for all vessels that are to be had for either Lake Michigan ports or the head of Lake Superior. Wild ore rates are not fixed as yet, but it is thought they will be about equal to the contract rates—60 cents from Lake Superior and 50 cents from Escanaba. This is entirely dependent, however, on the demand for grain carriers after the fleet begins moving.

General Superintendent Joseph Ripley has his force of men busy in the preparation of the Sault Ste. Marie canal for the opening of navigation. In the Poe lock 700 bolts have been placed in the culverts, new cable shelves have been installed throughout, and the entire machinery rearranged and repaired. Piles have been driven for the extension of the northeast pier at the easterly approach of the Poe lock, for a distance of 650 feet. For the Weitzel lock new lower gates have been built and the westerly approach to the dock has been deepened. A new pressure pipe will also be installed.

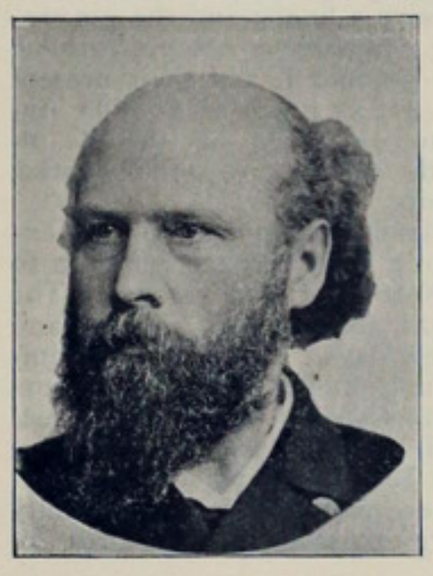


STEEL TOWING STEAMER "R..W. WILMOT," MOST POWERFUL TUG IN AMERICA. BUILT BY GLOBE IRON WORKS, CLEVELAND. AND JUST ADDED TO THE FLEET OF W. G. WILMOT & CO., COAL MERCHANTS OF NEW ORLEANS, LA

TRIPLE-SCREW SHIPS.

ENGLISH EXPERTS DO NOT AGREE WITH ENGINEER-IN-CHIEF MELVILLE OF OUR NAVY IN CLAIMS MADE FOR CRUISERS OF THE COLUMBIA-MINNEAPOLIS KIND—WATER TUBE BOILERS AND QUADRUPLE EXPANSION ENGINES PROPOSED FOR NEW TRIPLE-SCREW CRUISERS.

The heads of the navy in England have never taken kindly to triple-screw ships. Unlike France and other naval powers of the Continent, they seem to have paid little attention to claims of superiority made for the triple-screw cruisers Columbia and Minneapolis, which are the pride of our navy, at least in the eyes of Engineer-in-Chief George W. Melville. It is not surprising therefore that the ideas of the engineer-in-chief on the subject of the "Logical Arrangement of the Motive Power of War Ships" should meet with some pretty severe criticism when presented to the recent annual meeting of the Institution of Naval Architects in England. Commodore Melville's paper, which was read by Lieut. Harold P. Norton, who is representing the United States navy department at the Armstrong works, Newcastle-on-Tyne, was the feature of the meeting, and the discussion attending it is of especial interest in this country just now—probably more so than the paper itself—as it is understood that the new fast cruisers, provided for by the last congress, are to have water tube boilers and quadruple expansion engines throughout, using thirteen cylinders in all in three main engines. The design proposed is an arrangement of triple screw engines with approximately one-half the total power placed upon the center engine, and approximately one-quarter on each of the wing engines.



GEO. W. MELVILLE.

It was in support of this idea and the performance of the Columbia, Minneapolis and other triple-screw ships that the chief engineer of our navy addressed a lengthy paper to the meeting in England. Deductions based on about 200 trials of nearly as many ships led him to the conclusion, he said, that the propulsive efficiency of vessels with three screws was in almost every case above that of ships of approximately the same size, speed, and general lines, but fitted with only two sets of engines. The Columbia and Minneapolis, five-year-old ships, which are ten years old in design, are still, Commodore Melville said, among the most economical vessels in the world's navies as far as propulsive efficiency goes. The main cause of this efficiency lies in the use of three engines and propellers for the motive power. Not only has the propulsive efficiency been benefited but there are so many engineering and tactical advantages derived from the use of triple screws that it may be readily seen why so many ships are now designed for this system of propulsion.

CLAIMS OF ADVANTAGES IN TRIPLE SCREWS.

One of the greatest advantages from the use of triple screws is that smaller propellers are required for the same total power. It allows a reduction in diameter of screw of over 20 per cent, and while, as will be pointed out, this is accompanied by an increase in the number of revolutions, the speed of periphery may readily be reduced below what is required in twin screw practice. At the stern of the ship, amidships, in the following wake—always present to some extent with the most carefully designed hulls—the effects of a large screw are not so signally bad. Cavitation, or the tendency thereto, is reduced greatly in this following wake, and, on that account a considerably greater efficiency is obtained from the screw at the stern post than from those on the quarters. Whatever the cause, this increase in efficiency is so well shown by the results of trials that it can no longer be questioned. What is meant, of course, is the trials of large ships, not tank experiments. The latter serve very well for determining the actual resistance of a hull, but not for fixing the economy of propulsion, or the ratio between the towing and indicated powers. It is in the increase of efficiency, and not in any decrease in resistance, that the economical advantage of triple screws must be found. No test of a propeller can be held to have so much value as a test upon ships. Model experiments of propellers are not satisfactory. It requires experiments with the full-sized screw, working at the designed pitch and at its designed speed, under its full load of work, to give conclusive results. Trials under these conditions have shown as already noted, a considerable advantage due to the use of triple screws. Investigation along this line has not yet proceeded far enough to permit of more than tentative figures as to the propulsive efficiency due to the different methods of arranging the screws. It is, however, certain that there are gains from both the use of small screws, and of a screw working in the following wake, and that these gains would naturally grow with an increase in speed. Speaking only of full power trials, it will probably be found that up to some low speed not yet determined it will be best, from the economical standpoint only, to use a single screw; beyond this point it will be found that the use of twin screws would tend to a reduction in the power required for a given hull and maximum speed, and that at any time where twin screws are good triple screws are better. The average economy over single screw ships from the use of twin screws is about 8 per cent for vessels of maximum speeds from 12 to 20 knots, and triple screws are more economical than twin screws by from 5 per cent for 15-knot ships to 12 per cent for those of 24 knots speed. These figures are approximate, but they are from trial data of many ships fitted with the different methods of screw propulsion. This point has been discussed at considerable length, principally to develop these conclusions: First, that the use of triple screws leads to a considerable economy at the highest speeds; second, decrease in size of screws is peculiarly economical as regards the wing screws, and third, to evenly distribute the ill effects of high peripheral speed and to take advantage of the following wake; the center screw should be made larger than the wing or side screws.

PROPOSED DESIGN FOR OUR LATEST SHIPS.

Following these conclusions Commodore Melville's paper deals with many other advantages in men-of-war due to the smaller screws, particularly the smaller wing screws, but most of which have already been heard on several occasions in discussion of this subject. Referring particularly to new conditions that have especial bearing on the plans for the new cruisers, he says: "It is, of course, a fact that the use of three engines multiplies the number of engine parts. The resulting disadvantage is, however, much more apparent than real. The Columbia and Minneapolis are examples of the practicability of installing large power in three three-cylinder engines, and this was accomplished with a stroke of but 42 inches. There is no doubt that it would have been necessary to use four-cylinder engines, at least, if twin screws had been used. The absolutely necessary increase in the number of cylinders is thus shown to be but one-eighth. Of course, it is understood that the use of three-cylinder engines is now generally approved. It is merely pointed out as feasible, and as intended to show that the arguments against triple screws, based on the multiplicity of engine parts, could readily be made of practically no weight, if other conditions did not render advisable an increase in the number of cylinders. Water tube boilers have now come to stay, at least as far as the United States navy is concerned. These bring with them steam of high pressure, and cause the use of quadruple expansion engines for economy's sake. At 200 pounds pressure the quadruple expansion engine gives sufficient gain to justify its employment. Owing to the low powers of peace-cruising with men-of-war, it is questionable whether it is desirable, with these ships, to design engines for the greatest economy at the highest powers. Unquestionably an arrangement of cylinders which gives the greatest economy at the highest powers produces a markedly uneconomical engine for the lower powers ordinarily used in peace. The wide variations in present designs show how different designers view this problem. It is extremely complicated, and I am free to confess that much more data than are now available is needed for a full solution. We must know the cost of running the auxiliary machinery, and not only the average power of the main engines, but their range of power, must also be carefully considered. It has been thought advisable, however, in the design we are proposing for our latest fast ships, to use quadruple expansion engines throughout, using thirteen cylinders in all in the three main engines. This is a considerable change from the practice of twenty-five years ago, when two cylinders were most frequent. But the fact that this large number of cylinders has been adopted shows that our experience, at least, is that the argument of the multiplicity of parts of the engines has comparatively little weight. The decrease in the size of parts, with the consequent increase in accessibility, in accuracy of adjustment, and in case of repairs, is a natural sequence of the growth in the number of parts, and seems sufficient to overcome the disadvantages. It will be pointed out, further, that the increase in the number of working parts due to the use of triple screws is only apparent, as ordinarily there would be not more than eight cylinders employed on our triple screw ships against ten cylinders that would necessarily be used in the proposed five-cylinder quadruple expansion engines for our twin screw ships."

Referring to the position of the British admiralty in the matter, the author says: "The statements I have made as to the desirability of using three screws on war vessels, and the fact that they are being used to so great an extent in the Continental navies, will naturally lead the thoughtful student to wonder why they have not been adopted, to some extent at least, in British vessels. This feeling will be the stronger from the fact that British engineers are justly considered to be thoroughly progressive, and abreast of the times with respect to every feature that would tend to an increase in the efficiency of vessels. It has occurred to me that, whatever other reasons may have caused this non-use, until now, of triple screws on British vessels, one feature of the case at least may serve as a partial explanation. I am led to this belief all the more from the fact that it agrees with the experience of all designers with respect to some forms of marine machinery, which, while apparently very peculiar, are the best adapted to the particular cases where they have to be used, namely, the exceedingly light draught steamers required for certain river service. Yacht designers are very familiar with the fact that vessels designed for general cruising on the English coast are very different from those for general use on the coast of the United States, due to the fact that in England there is everywhere an ample depth of water, while in the United States the reverse is the case. In just the same way, we in the United States are restricted in the draught of our war vessels to about 24 feet, while the large British ships can, and do, in some cases draw about 27 feet. As a consequence of this radical difference in the circumstances under which large powers have to be applied, the problem of the number of propellers is presented to the designers on the two sides under a different aspect, and I am inclined to believe that this has had a great deal to do with the fact that British designers have not paid much attention to three screws thus far. Had they been compelled to face the problem of putting large powers in light-draught hulls, I think they would have been driven to a consideration of the advantages of three screws, and probably would have taken hold of the matter with their characteristic energy. Let me add, in conclusion, that I have given this subject of triple screws very careful study, and I believe that for war vessels their use is thoroughly logical. Further than that, I believe that, although contrary to the generally accepted idea of duplication of parts as far as possible, the plan which I have suggested for dividing the power between one large central engine, to develop about half the power, and two smaller wing engines, each of about one-quarter power, will give the best results, and is likely to be the system that will finally obtain general adoption."

SUMMARY OF ADVANTAGES AND DISADVANTAGES.

Advantages and disadvantages in the case of triple screws are thus summarized:

Advantages—Smaller engine parts; greater ease of overhauling; greater accuracy of adjustment; lack of vibration; sub-division of power;

increased (probable) available power; increased ease of protection; increased handiness when partly disabled; smaller water-tight compartments; smaller propellers; more efficient propellers; less peripheral speed of propellers; less screw friction; increased revolutions of engines; decreased loss from cavitation, the word being used in its broadest sense; increased efficiency of the screw working in the following wake; decreased danger to propellers in ramming; decreased danger to ship that is rammed or torpedoed; shorter propeller shafting; decreased racing of screws; freer design of stream lines; freer access of water to screws; increased piston speed and economy; decreased total size of cylinders; decreased weight of machinery; decreased condensation in engines at all—especially at low—powers; adaptability to light draft; high ratio between stroke and diameter of cylinders; less glacis plating required; ease of propeller design; latitude of engine design; great gain in economy at low powers.

Disadvantages—Greater number of parts; greater number of valves and pipes; greater number of auxiliaries; increased engine room force; loss of power due to drag of idle screw; with center engine alone used, the loss of the tactical advantages due to twin screws.

In the case of the proposed system of triple screws with small wing engines the only disadvantages set down are that there would be two sizes of engines in the same ship, increased cost of building and increased number of spare parts to be carried, while the advantages claimed are: The arrangement fits the ship; ease of installation and design; great gain in economy at all speeds; tactical advantages of twin screws economically retained; engine room space reduced; powerful center engine has a most economical screw working in following wake; vibration minimized; loss from drag of screw minimized, one screw only being dragged; small size of working parts; two independent plants, each capable of economical propulsion up to 15 knots speed; small size of working parts with maximum ease of repairs.

CRITICISM OF ENGLISH EXPERTS.

In discussion of the paper, both Mr. A. E. Seaton and Professor Biles said that it would have been more satisfactory if the author had stated the data upon which he arrived at many of his conclusions. In Mr. Seaton's opinion Commodore Melville had stated his case most ably, but had stretched it a little further than was necessary. He had given fullest value to the advantages that followed the use of triple screws but had minimized the disadvantages. The nuisance that arose from the engines not in use had been dealt with lightly. If three engines were to be fitted, the center screw should have more power than the wing screws, but he would suggest that the center propeller should be two-bladed, so that it should be shielded by the stern-post when not in use and the drag would be less. In conclusion, he would say that the paper would form a most valuable addition to the transactions of the society, for the author, at least, had put the various points relating to triple screw propulsion in a light that perhaps few had seen it before.

Professor Biles thought the paper was open to criticism that the author had tried to prove a little too much, but that was due to his generous and enthusiastic nature, which was also the cause of so much of his success in life. His triple screw ships might be looked on in this way. He had taken a twin screw ship and divided one set of engines into two parts. There were, however, twin screw ships both in British and in the American navy which had two distinct sets of engines on each line of shafting, and it might be said, therefore, that the Commodore had taken a four-engine twin screw ship and knocked two of the engines into one. In any case the advantages claimed for the bigger engine did not all apply to the whole of the machinery, but only to 50 per cent of it. It was easier, however, to get in three propellers than two on a given draught. The author had said that with three screws a better performance was obtained at sea in bad weather than if two were used. What the meeting would like to have had would have been the facts on which this statement was based.

Sir William White, director of naval construction, said that the subject of the paper was one in which he had taken the keenest interest throughout his professional career, and he hailed with gladness any opportunity of getting fresh information on the question. Some members might remember that twenty-one years previously he had read a paper in which he strongly recommended twin screws, not only for the purpose of affording a shallow draught design of vessel, but also for ships of deep draught. At that period the suggestion was not a popular one, but time had justified it. His excuse for recalling this earlier paper of his own was that it showed he had an open mind on the subject of multiple screws, and it would form a fitting preface to what he had then to say. There was a good deal of difficulty in dealing with a paper such as Commodore Melville had presented, because it was full of opinions, of speculations, and of arguments, but contained very few facts. When he heard the paper was coming he was delighted, and said, "Now, at last, we are going to have from the best authority the facts about the Columbia and Minneapolis." If, however, experiments had been made with these vessels, their details were not recorded in the paper, and there was, therefore, insufficient data for fortifying opinion. In an analysis of the performance of a steamship, to arrive at her efficiency, there was wanted a very great deal more than the author had given. Commodore Melville had said that 200 ships had been tried, but the speaker would like to know how many of these were triple screw ships. He thought that he had a fair knowledge of what trials had been made with vessels of that class and, so far as he knew, they were comparatively few. He was afraid that the deductions contained in the paper were built up on a very slender basis. He appeared before the meeting in an unusual position. He knew more than he was able to say, that was not a usual condition, but it arose sometimes. He had knowledge of experiments, but he could not furnish the facts, as they were given him as personal information only. The paper said that three screws led to economy. He knew of no facts supporting this statement. The paper also recommended a third arrangement of triple screws in which there would be small wing engines with the large engine in the center. In Russia the three-screw ships, however, had large screws at the sides. There was material information in the paper in regard to the waste work of revolving an idle screw. The author had taken a vessel of 12,000 tons, 23,000 horse power, and 22 knots speed. Now, it was evident that was not an American ship, and it would be interesting to know what vessel it represented. Again, triple screws were recommended by the author as a necessity on account of a 24-foot draught, but he would undertake to produce a most effective twin screw vessel of the character indicated upon that draught. Speaking generally, the director of naval construction said that it must not be understood he altogether condemned triple screws, but he was of the opinion that the conditions laid down in the paper did not bear out that they were yet demanded. From what had been said, he was under the impression that Commodore Melville had not introduced in his analysis the results of model experiments. Naval architects were, however, under the greatest obligation to such sources of information, and found they were constantly borne out by actual trials which they had foreshadowed, and in working out results they had found it of advantage to come back to the model screws. In regard to the utilisation of the frictional wake, upon which the paper dwelt, he would point out that it was quite possible to speak of tendencies, but what was really wanted was the actual aggregate result. For instance, the late Mr. Froude had at one time favored putting the single screw far aft, to reduce the augment of resistance, reasoning on tendencies he had observed; but on experiment it was found that the balance of advantages was in favor of the ordinary arrangement. As a matter of detail, he would have liked to have seen a more exact statement as to the space occupied, not only by the engine compartments in a triple screw ship, but by the shaft passages. The stowage of ammunition was a problem that had to be solved in the design of all warships in the British navy. For well-defined reasons they distributed the ammunition as equally as possible between two ends of the ship, but with the three-shaft passages difficulty might arise. It was a detail which showed that one cannot discuss warship machinery from the point of view of efficiency alone. He trusted that what he had said would not appear to overlook the obligation the institution was under to Commodore Melville for the paper he had contributed, and if there were further information at his—the author's disposal, and if he were at liberty to give it, it would be a most desirable thing that it should be included in the transactions of the institution. The speaker had always thought that if we go on progressing as we have done in the design of engines and propellers, and if they remain based on the same general principle upon which they are now designed—if there were no radical changes thrusting existing practice on one side—then we might come to triple or other multiple screws. But as matters stood he did not think that Commodore Melville had made out his case.

GRAIN BILL OF LADING.

A circular letter just sent out by Secretary C. H. Keep of the Lake Carriers' Association, deals with the meeting of the executive and bill of lading committees of the association in Cleveland. On the 11th inst. the proceedings of the Buffalo conference, March 8 and 9, having been duly considered, the Lake Carriers' Association unanimously agreed upon the following action:

First. Each vessel owner may, if he so desires, at the time he charters his vessel, provide for an individual consignee at lake destination, and he may stipulate that if his vessel is sent to more than two elevators to load, the extra service shall be without expense to the vessel. It is believed that delays at ports of loading may thus be remedied to a great extent.

Second. The following provision should be included in all lake grain bills of lading. "If the grain covered by this bill of lading is consigned in care of a party at destination of vessel, then, unless the original of this instrument is there presented for cancellation on or before arrival of vessel, delivery to the party in whose care the grain is consigned herein, shall be a good and valid delivery."

Third. The Lake Carriers' Association accepts the offer of the commercial exchanges tendering the services of their respective boards of arbitration without expense to the Lake Carriers' Association, to hear and decide any claims the association may desire so heard and decided, in respect to any exceptional detention for which the lake carrier deems it just that demurrage should be paid by the party or parties responsible for such detention, or in respect to any exceptional grain shortage for which the lake carrier claims he should be relieved from liability.

Fourth. The Lake Carriers' Association will appoint a committee of three of its members, resident in Buffalo, to act in consultation with the committee of control, provided by the Western Elevating Association, in securing prompt dispatch in unloading grain vessels at the port of Buffalo.

Fifth. The grain trade having objected to the shortage clause which the Lake Carriers' Association proposed to insert in the lake grain bill of lading, upon the ground that the commercial value of the bill of lading for collateral uses would be impaired, the association has decided not to insist upon the use of the proposed clause, but to allow the existing shortage clause to stand unchanged until the close of the present lake season. The Lake Carriers' Association then hopes to present a definite and reasonable shortage provision, that will not be subject to objection by the grain trade upon the ground of uncertainty in use.

Sixth. No clause providing for the payment of demurrage will be inserted in the lake grain bill of lading this season. The detention clause proposed at the Buffalo conference as a substitute for the demurrage clause, will be modified in consultation with the counsel of the Lake Carriers' Association, so as to express correctly the practice which it is understood will, by mutual agreement, govern the unloading of grain cargoes at grain delivery ports this season. The secretary of the Lake Carriers' Association will then submit the detention clause, as modified, to each vessel owner for vote as to the advisability of inserting said clause in lake grain bills of lading after a named date.

Seventh. It is understood that the grain trade, rail carriers and elevators, will co-operate in every reasonable way to correct abuses in the matter of shortage and detention and to secure dispatch to vessels at ports of loading and unloading.

NOW ONE CONCERN.

ALL THE LEADING SHIP BUILDING AND DRY DOCK PLANTS OF THE GREAT LAKES ARE OWNED BY THE AMERICAN SHIP BUILDING CO.—FULL DETAILS OF THE CONSOLIDATION.

This country has heard of a great many big industrial organizations of late but none more conservatively formed than the American Ship Building Co., long talked of and now a reality. Although plans have been under way for more than a year past for the consolidation of the principal ship building and dry dock plants of the great lakes, no reference whatever has been made to the matter up to this time in these columns. It was fully understood that the organization was being perfected on most conservative business lines—no great inflation of stock or high valuation of property—and it was deemed advisable therefore to say nothing, as premature announcements might possibly interfere with the work while it was under way. This silence has been rewarded by a full telegraphic report from the principals of the meetings now being held in New York, and it can be announced positively that the officers of the consolidation, elected today (Thursday) are as follows:

President—W. L. Brown, Chicago Ship Building Co.

Vice-President—Robert L. Ireland, Globe Iron Works Co., Cleveland.

General Manager—James C. Wallace, Cleveland Ship Building Co.

Sec. and Treas.—R. C. Wetmore, American Steel Barge Co., New York.

Executive Committee—W. L. Brown of Chicago, A. McVittie of Detroit, James C. Wallace of Cleveland, Robert L. Ireland of Cleveland, Luther Allen of Cleveland, Colgate Hoyt of New York, and W. E. Fitzgerald of Milwaukee.

Board of Directors—W. L. Brown and H. H. Porter, Jr., of Chicago; Robert Wallace, James C. Wallace, H. M. Hanna, L. C. Hanna, Robert L. Ireland and Luther Allen of Cleveland; Colgate Hoyt of New York; Samuel Mather of Cleveland; W. E. Fitzgerald and Andrew M. Joys of Milwaukee; A. McVittie and Gilbert N. McMillan of Detroit; W. T. Coleman Carpenter of New Jersey.

The plants acquired by the new company are those of the American Steel Barge Co. at West Superior, Milwaukee Dry Dock Co., Chicago Ship Building Co., Detroit Dry Dock Co., Cleveland Ship Building Co. at Cleveland and Lorain, Globe Iron Works Co. of Cleveland and Ship Owners' Dry Dock Co. of Cleveland. Neither the Wheeler plant at West Bay City nor the Craig works at Toledo have at any time been regarded as necessary in the scope of operations planned for the consolidation. The plant of the Union Dry Dock Co. at Buffalo would undoubtedly have been included but for obstacles due to the control of these works by a big corporation, the Erie Railroad, which could not without great difficulty give up a part of its corporate interests. The position of the Buffalo ship yard in the new order of affairs is quite well defined, however, and the plans of the consolidation will not be greatly interfered with on this account.

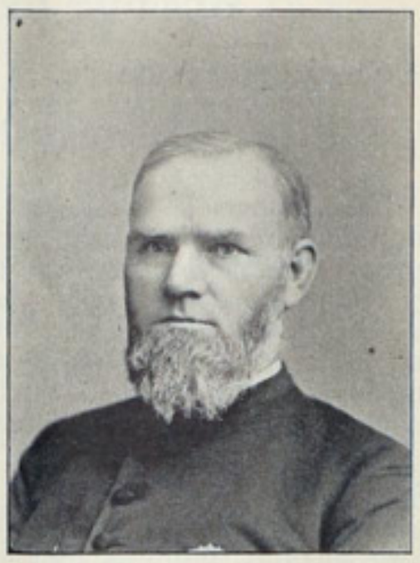
The American Ship Building Co., organized under New Jersey laws, has an authorized capital of $30,000,000. The actual capital, however, is only $14,000,000, of which $7,000,000 is non-accumulative 7 per cent stock and $7,000,000 common stock. The $7,000,000 of preferred stock, which in one sense represents the value placed on the several plants turned into the combination, is of course the main feature of capital, actually paid up at full value. The $7,000,000 of common stock, also of $100 per share par value, has been distributed, share of common with share of preferred, at $20 a share, the fund thus derived to be used as a working capital. It will be understood, of course, that the non-accumulative dividend feature means that if the 7 per cent dividend is not earned it will not be paid on the preferred stock and the common stock is accordingly the more valuable on this account. It is this basis of organization that has caused the new company to be looked upon as probably the most conservative of all industrials as yet formed in this country. There was, of course, no necessity for underwriting of stock. It was all taken up by the old companies and the greatest difficulty encountered by the old officials was to avoid making enemies on account of their inability to distribute any great part of the stock. Every share in the consolidation might have been sold many times over, as it was fully understood that the management was to remain entirely in the hands of men who had been responsible for the upbuilding of this great industry on the lakes and whose interests are in the consolidated organization as much as they have ever been in the several old companies. Even in the first steps toward organization it is reported that the only differences that have arisen have been over the question of so fixing management as to avoid high salaries.

The different plants have in all eleven dry docks, including one large new dock now under construction at the West Superior works. These entered largely into the valuations placed on the several properties. The fact that the ship yards of the Cleveland Ship Building Co. and Chicago Ship Building Co. are more modern in equipment than most of the others was in their favor but after all there was not a very wide

R. L. IRELAND, VICE-PRESIDENT. A. McVITTIE. | JAS. C. WALLACE, GEN. MNGR. COLGATE HOYT. | R. C. WETMORE, SEC'Y AND TREAS. LUTHER ALLEN. | W. L. BROWN, PRESIDENT. W. E. FITZGERALD.

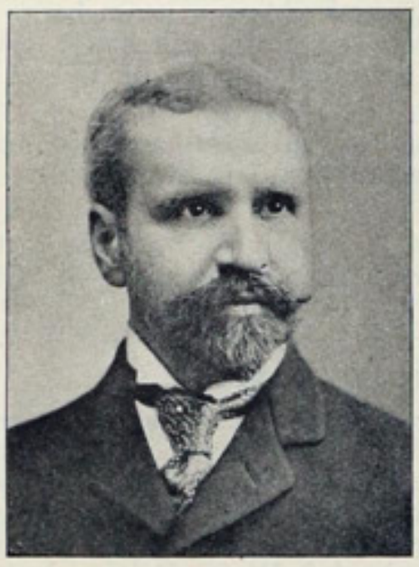
HEADS OF THE AMERICAN SHIP BUILDING CO.—THE BOARD OF CONTROL.

difference in the valuations. The Detroit Dry Dock Co. was first, running close to a million and a half, on account of a long stretch of valuable river-front real estate, most of it in the very heart of the city of Detroit, and on account also of other interests like the Detroit Sheet Metal & Brass Works. The only other company going in at more than a million was the Cleveland Ship Building Co., which has lately completed at Lorain one of the finest ship yards in the country. Three other plants were valued at figures ranging above $900,000, and the lowest was $750,000. The ships of the American Steel Barge Co. are not, of course, taken over by the new company. It was the separation of the vessel interests of the barge company from the ship yard that caused newspaper reports a few weeks ago of a new ship building company.

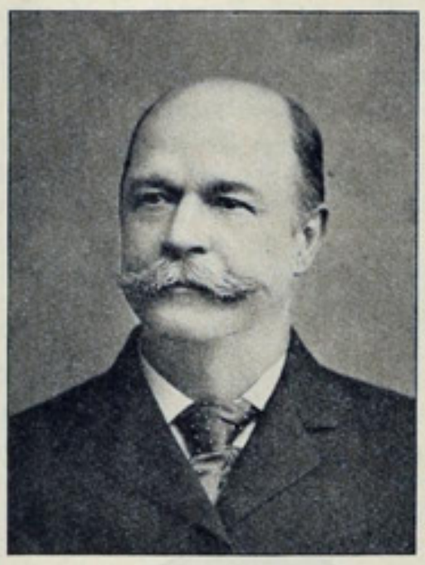


ROBERT WALLACE, FOUNDER OF THE CLEVELAND SHIPBUILDING CO.

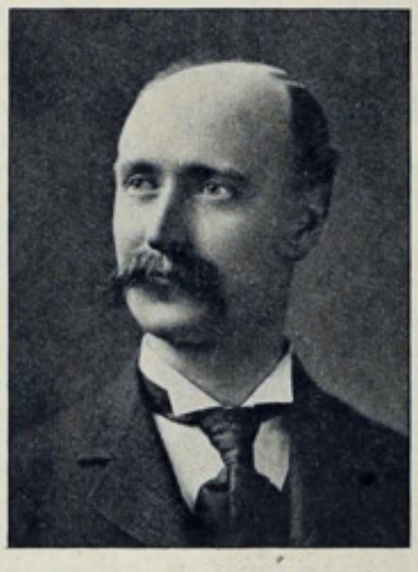
It is evident from the names constituting the executive committee, or board of control, that practically all affairs of the organization will be dictated by that committee, which includes the men who brought about the consolidation. There are on this board, aside from the officers, Mr. Luther Allen, representing the Ship Owners' Dry Dock Co., Mr. A. McVittie, representing the Detroit Dry Dock Co., and W. E. Fitzgerald of the Milwaukee Dry Dock Co. It is not probable that either Mr. Allen or Mr. McVittie sought active positions, as they have both had their day at the hard labor of attending to the details of ship yard management. The president, Mr. Brown of Chicago, is also a man of large affairs. In the position of president he will not be called upon to follow up the actual work of building and repairing ships. The younger members of the board are to assume this responsibility, and it will certainly be a matter of congratulation among the friends of James Wallace to learn



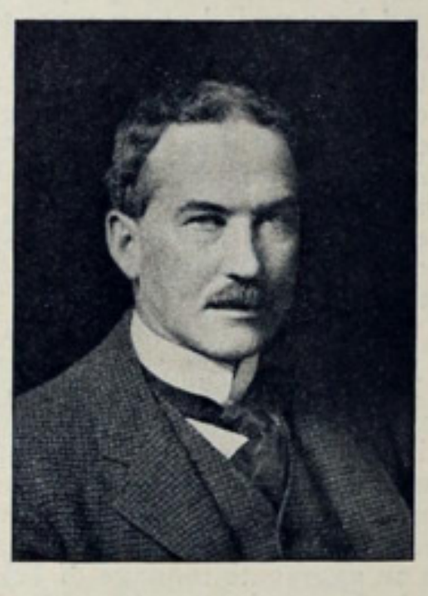
JAMES H. HOYT,
LEGAL ADVISER IN THE WORK OF ORGANIZATION.



ROBT. W. HUNT,
EXPERT ENGINEER, APPRAISER OF THE PLANTS.



ROBT. LOGAN,
NAVAL ARCHITECT, APPRAISER OF THE PLANTS.



J. J. LYNN,
WHO BROUGHT ABOUT THE FIRST MEETING OF PRINCIPALS.

THEY TOOK PART IN THE ORGANIZATION OF THE AMERICAN SHIP BUILDING CO.

that he has been entrusted with the management of an organization so large as this great ship building combine. He has been upheld in this movement, as well as in the building of the big plant at Lorain, by a father of a most unselfish and admirable disposition, whose delight all the time is in the advancement of young men, whether near to him or not. The assistant manager will undoubtedly be W. E. Fitzgerald, who has for a long time past been in close touch with Mr. Wallace, and whose abilities have been recognized particularly since the consolidation was undertaken. The headquarters of the company will be in Cleveland, and Mr. Wetmore, secretary and treasurer, will come here shortly to locate permanently. He is also a young man, but experienced in affairs of large institutions. He has been associated with Mr. Colgate Hoyt and other well-known capitalists of New York in big enterprises, some of them very close to Standard Oil interests. It is as yet probably a little early to talk of the scheme of management for the different yards, but the present understanding is that there will be one chief naval architect to look after the hulls and one chief of enginering work, both located at the main offices, together with a resident superintendent at each of the several works. The assistant general manager, Mr. Fitzgerald, will probably give attention particularly to operations at the upper lake yards.

A plan under consideration by the consolidation which seems entirely feasible, but about which nothing has been said officially, is the construction of three or four standard classes of so-called stock ships with a view to keeping in steady employment the plants engaged on new work. It is more than probable, of course, that while repairs will be distributed, the new work will, after the present rush is over, be confined largely to the plants at Chicago, Lorain and Cleveland, and possibly Detroit, all of which are close to sources of material, and the first two of which are especially adapted to cheap construction, on account of the up-to-date condition of their equipment. The stock ships would be first a 450 or 500-foot type of coarse freight steamer, the kind of vessel now in demand in ore and grain trades of the lakes. Then a standard steamer of Welland canal size, to meet the demand that is expected for vessels that will pass through the Canadian canals to the Atlantic coast upon completion of the canal improvements next year. A big demand for this type of vessel is already in sight on the Atlantic, for the South American and West Indies trade, and it is figured that these ships can for a long time to come be built cheaper on the lakes than anywhere else in the country. Next to this class would be a standard type of steel tow barge say of 7,000 to 8,000 tons capacity, such as have been built in large numbers by the ore companies of late. Other standards could be established for ocean going tugs, such as have been built at West Bay City and Cleveland, and also harbor tugs. The saving in cost of designs and in many other ways from a proceeding of this kind would be a very important item, and it would eventually lead to a situation that would do away to a large extent with contracts for the ordinary types of ships, as the ship owner in need of a vessel would find one completed or well along towards completion almost any time. It is also the intention of the consolidated companies to take up the building of mining machinery and other heavy engine work.

The story of how the consolidation was brought about is thus told by an officer of one of the companies: "One of the Lynn brothers of Port Huron—J. J. Lynn, who represents the General Electric Co. on the lakes—had been back and forth to New York and gained some knowledge of what was going on about a year ago in the way of other big consolidations in the east. It was he who first undertook plans away last June to bring about a meeting of the heads of the different companies. He knew that while some of the yards were then as they are now making money on repair work, the competition for orders for new ships was so severe that we were actually building vessels here cheaper than they could be produced on the Clyde. He took the matter up first with Mr. A. McVittie of the Detroit Dry Dock Co. He had fallen into the right place at the outset. He could not have found among the ship builders a broader man or one more capable of picking up the ends of such a proposition. Mr. McVittie had already been considering it, but could not be known in the scheme at the outset. He helped Lynn make the balls and Lynn fired them. A few of the builders finally consented to think the question over with a promise that they would give answer later. Matters went along in that way until about December, when the first meeting, attended by Messrs. Brown, Hoyt, McVittie, Wallace, Fitzgerald and Ireland, was held at the Waldorf in New York. From that time on the deal took a business form. Appraisers were soon at work. They were Robert Logan of Cleveland, expert in ship building affairs, and Robert W. Hunt of the Chicago firm of Robt. W. Hunt & Co., engineer experts in machinery and iron and steel generally. Their work was highly satisfactory. The formation of the new company under the laws of New Jersey and all the important legal details that were necessary after an understanding was reached between the ship builders, have been carried out by Mr. James H. Hoyt of the firm of Hoyt, Dustin & Kelley of Cleveland. Messrs. Brown and McVittie are thanked especially for the successful outcome of the undertaking. Mr. McVittie sought no office. He is on the board of control not on account of any demand for the place, but for the reason that he was wanted there and was himself interested in seeing the whole scheme well carried out. Frank E. Kirby will probably not be connected in any way with the new company. He has not looked for a place and does not need it. The Cramps have been after him for a long time past, but he will probably never again be tied up with a ship yard. It is understood that he goes to New York to open an office as a consulting engineer. Every owner of a steel ship will share in the advantages of this consolidation. It is certain to increase to some extent the value of all ships now in commission on the lakes."

The United States hydrographic office gives out the following information regarding channels in the vicinity of the ore docks at Duluth, western side of St. Louis bay, gleaned from a blue print of the harbor furnished by C. H. Martz, chief engineer of the Duluth, Mesabi & Northern Railroad: The channel leading up the bay to the iron ore docks at Oneota is 110 feet wide and 16 feet deep. Off the outer extremity of ore docks Nos. 1 and 2 the channel is 400 feet wide and 20 feet deep, thus allowing the largest craft to make the turn. The channel between the two docks is from 150 to 125 feet wide and is 18 feet deep. The channel on the outer side of ore dock No. 1 is 125 feet wide and 18 feet deep. The channel on the outer side of ore dock No. 2 is 105 feet wide and 18 feet deep. Ore dock No. 2 is 1,828 feet long, it having been extended 576 feet last year. This season the dock is being extended 576 feet still farther, which will make its outer extremity in line with ore dock No. 1. The latter dock is 2,336 feet long. At a distance of 150 feet from the side of ore dock No. 1 a log dock extends from the shore for a distance of 1,364 feet. This log dock and ore dock No. 2 are on the opposite sides of ore dock No. 1.

MARINE REVIEW

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Judging from the editorial expressions of British journals, the ship builders and naval architects of the United Kingdom do not appear to be very favorably impressed with the unarmored cruiser Kasagi, constructed for the Japanese navy by the Cramps of Philadelphia, and which left for England some weeks ago to receive her armament. It should be stated in explanation, however, that the majority of the criticisms advanced are directed against the arrangement of the armament rather than to any alleged defects in the construction of the cruiser. The British critics claim that the large projecting sponsons, with two heavy guns and mountings fore and aft, each weighing over 30 tons, give the impression of excessive top weight, while the further claim is made that with the latter perched as they are upon the poop and forecastle, with 30 tons weight so close to the stem and three anchors in addition, as well as chain cables, etc., the Kasagi will be very likely to plunge and make very bad weather in a heavy sea. The entire satisfaction of the Japanese officers with their new vessel was, however, demonstrated repeatedly while she was under construction at Philadelphia, and especially on the occasion of the official trial.

Japan has within the past few years given many of the nations of older civilization lessons in naval matters, at least in the matter of securing modern vessels of the most servicable types, and now a subsidy bill introduced in the Japanese house of representatives constitutes an object lesson that should be fraught with more or less suggestion, especially for the United States. The proposed subsidy will, if the bill is passed, be granted for a period of ten years to steamship lines plying between Japan, Europe and America, the ports to be touched in this country being Seattle and San Francisco. In amount the subsidies are quite liberal, the conditions on which they are granted being that twelve steamers of more than 6,000 tons, having a maximum speed of over 14 knots, shall be maintained on the European line; three steamers of over 6,000 tons gross and a maximum speed of 17 knots in the San Francisco service, and three steamers of more than 6,000 tons and capable of attaining 15 knots speed in service between Japan and Seattle. The steamers for Europe must sail twenty-six times a year; those to San Francisco fourteen times, and those to Seattle thirteen times per annum.

It is now certain that the year ending June 30—fiscal year of the treasury department—will prove the most prosperous year of ship building in this country since 1891. Statistics compiled by the bureau of navigation for the first three quarters of the year show that during these nine months the bureau has recorded the construction of 632 vessels of 169,794 gross tons, as against 541 vessels of 58,159 tons in 1898 and 460 vessels with an aggregate tonnage of 125,035 in 1897. The report will show that already five steel steamships for trade with the West Indies, subject to the postal subsidy act of 1891, have been built. Since July 1 twelve merchant vessels have been named Dewey, and six have been christened Sampson while three have been named for the Oregon and two for the Iowa. These are only a few of the more striking of a number of cases of the duplication of names which are cited, but they will serve to demonstrate the need for placing a restriction of some kind upon this indiscriminate repetition. The disadvantages of the practice have repeatedly been made painfully manifest on the great lakes, on the Atlantic coast and in fact in shipping sections all over the country.

The vision of great battles fought with submarine ships has little attraction for the able officials of the British admiralty. In responding to the toast "Our Naval and Military Forces" at the dinner attending the recent annual meeting of the Institution of Naval Architects in London, Vice-Admiral Sir Frederick Bedford, second naval lord of the admiralty, said he was glad to think that the ideas of naval architects in England did not appear to be running in the direction of submarine boats. If there was to be any fighting before the era of international peace, which everybody professed to look forward to and no one believed in, for Heaven's sake let it be above water. A submarine boat might have its uses, but it appeared to him that the gentleman in charge of such a boat would have as much difficulty in distinguishing under water his foes from his friends as a mad bull would have in discriminating between a vegetarian and a beef-eater. He observed that lately the submarine boat had an eye given to it, so that part of the vessel would be above water. That being so, he should think that a cold chisel in the bow of a destroyer would be sufficient for dealing with it.

The Philadelphia Commercial Museums is to be congratulated upon the occupancy of the presidency of the institution at this time by Mr. Charles Henry Cramp, whose qualifications for a position requiring a broad-spirited, energetic and many-sided man are sure to be demonstrated most conclusively during the exposition to be held in Philadelphia in the autumn of 1899 in the interest of the development of American manufactures and the expansion of our export trade. The exposition is the outgrowth of the museums and the temporary and permanent institutions will be intimately connected. The exposition will be under the joint auspices of the museums and the Franklin Institute, and here again the diversity of Mr. Cramp's interests finds demonstration, for the great ship builder has been for years a manager of the Franklin Institute. Mr. Cramp, it will be understood, is not at the head of the exposition itself, but no one acquainted with him can doubt that his influence will be felt.

OUTPUT OF THE SHIP YARDS.

TWO MORGAN LINERS SLIDE INTO THE WATER AT NEWPORT NEWS, WHILE THE JEFFERSON GOES DOWN THE WAYS AT THE ROACH YARDS, CHESTER, PA.—NEW CONTRACTS.

The steamers El Norte and El Sud, the first of the four Morgan liners building at the yard of the Newport News Ship Building & Dry Dock Co., Newport News, Va., were launched Saturday, April 15. Assistant Secretary of the Treasury Taylor and Assistant Secretary of War Meiklejohn were the guests of honor at the launching. El Norte was christened by Miss Mary W. Orcutt, daughter of the president of the Newport News company. These vessels, which were fully described in the issue of the Review of March 30, are 406 feet over all, 48 feet beam and 33 feet depth. Of course the entire equipment is of modern character, including a complete outfit of Blake pumps.

The Pusey & Jones Co., Wilmington, Del., has launched the ferryboat B. M. Shanley, building for the Port Richmond & Bergen Point Ferry Co. The vessel was christened by Miss Mary Hunter Pusey, daughter of William W. Pusey, treasurer of the Pusey & Jones Co. This company has been awarded the contract, on a bid of $3,580 for the installation of four tubular boilers in light vessels Nos. 40 and 44 for the United States government.

At the Roach ship yard, Chester, Pa., on April 15 occurred the launch of the steamer Jefferson, building for the Old Dominion Steamship Co. The Jefferson, which is 327 feet in length, 42 feet beam and 27 feet depth of hold is a sister vessel of the Hamilton, which was launched some time ago and which has been pictured and fully described in the Review.

The Charles Barnes Co., Cincinnati, O., has launched the small steamer Emerald, which they are building for the use of the government engineers on Green river. She is 50 feet in length by 12 feet beam. Morton & Johns of Cincinnati are doing the joiner work.

P. H. Studer of Detroit, Mich., has nearing completion for Congressman Carlos D. Shelden of Michigan, what it is claimed will be the fastest gasoline launch on fresh water. She is 57 feet in length and 6 feet beam, and will cost $3,500.

Berger & Berger of Manitowoc, Wis., are building a steam barge for Johnson & Denessen of Green Bay, Wis. The vessel will be 92 feet in length by 22 feet beam and will be used in freight service on Green bay and Lake Michigan.

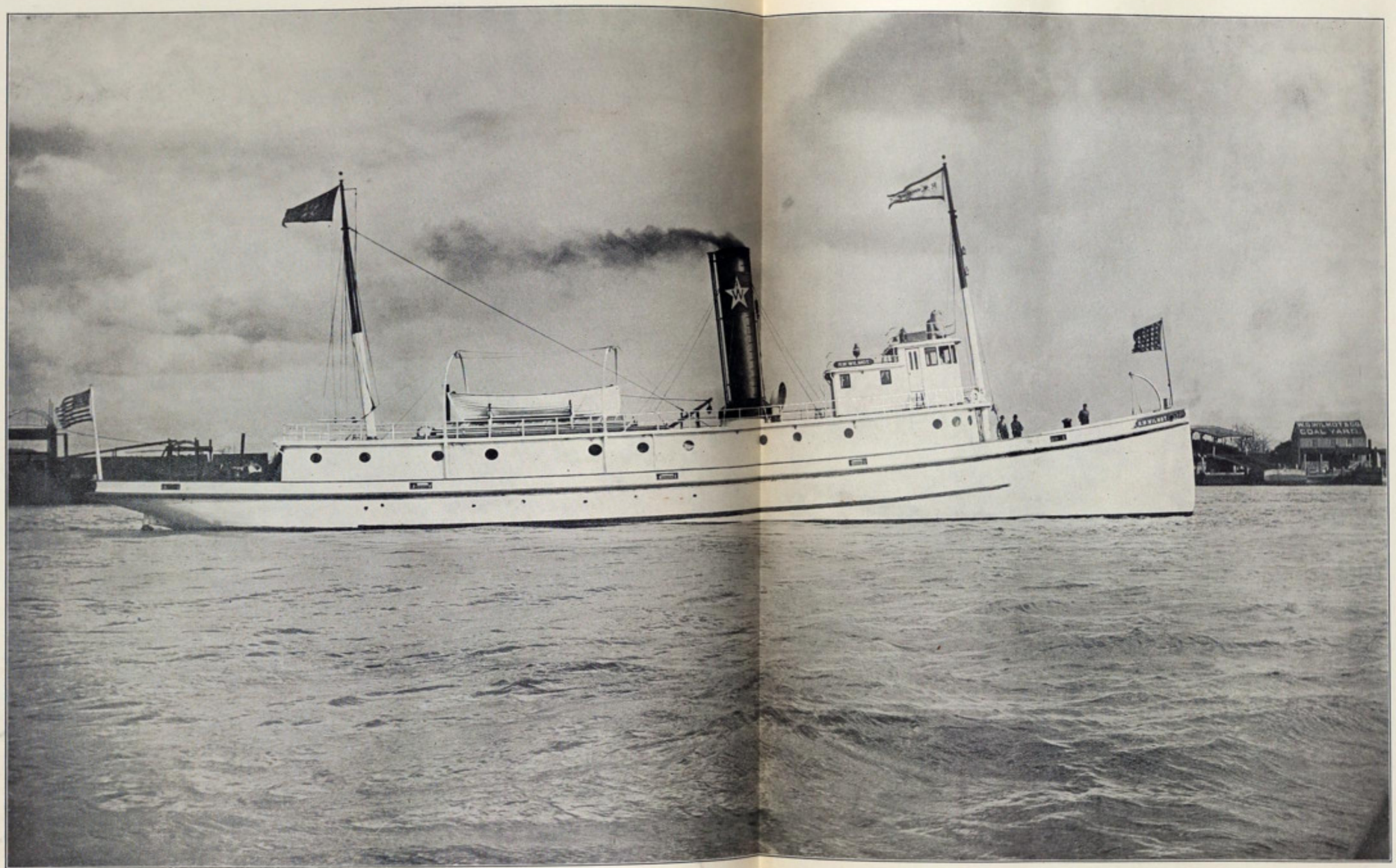
The Lynn & Boston Steamship Co. of Boston, Mass., announces that it will build a new steamer of 140 feet length and 28 feet beam, which will be fitted with compound engines.

Charles L. Barker of Pittsfield, Mass., is building for parties in that city a naptha launch which it is claimed will embody a number of radical improvements.

CHIEF ENGINEER OF THE OCEANIC.

As great an honor as could come to a man in the marine engineering profession has just been conferred upon T. Wilson Sewell, chief engineer of the White Star liner Majestic, who has been selected for the same position on the Oceanic—largest steamer in the world—now nearing completion for the White Star line at the ship yard of Harland & Wolff, Belfast, Ireland. A portrait sketch of Mr. Sewell from life, made for the Marine Review by R. Quiller-Lane, will be recognized by the friends of the chief engineer as an excellent likeness. Mr. Sewell, who is in his fifty-third year, has a wide and probably unique experience as a marine engineer, having made 276 round trips across the Atlantic, of which 274 were as chief engineer in the White Star service, where he has been engaged for twenty-eight years. He was born in Maryport, Cumberland, England, and educated, first at a private academy there, and afterwards at a country academy in Greenrow on the borders of England and Scotland. The earlier portion of his apprenticeship was spent at a locomotive works in Maryport, and at the end of four years he went to Laird's shipbuilding works, Birkenhead, and finished there. He went to sea in 1865, his first ship being the Uruguay, belonging to the Waterford Co., which traded to the River Plate, China, and the Mediterranean. Afterwards he entered Messrs. Lamport & Holt's service, and was for some time chief engineer of the Tycho Brahe. Joining the White Star line a couple of years later, he went into the new steamer Baltic, in 1871, and has since been chief in the old Oceanic, the Germanic, the Britannic (for sixteen years), the Teutonic, and the Majestic. He took both the latter vessels from Belfast on their first trip, and has been chief of the Majestic since 1889, until his present appointment to the Oceanic. So far as the engineering department of the mammoth liner is concerned, Mr. Sewell is confident it will fulfil all expectations and achieve the object of the White Star Co., which is to have a vessel that will leave Liverpool on Wednesday and land her passengers in New York on the following Wednesday, and vice versa. So far as can be ascertained from him—he is very reticent on the subject—there will be no attempt at record-breaking. The enginering department will have a staff of 182 men, including twenty-two engineers—about thiry more hands than are on the Majestic. The crew, all told, will number about 350. All the heavy pieces of machinery are now aboard the new steamer, and the work of completion is proceeding with all possible despatch.

The thirty-first annual report of the F oating Bethel, Sailors' Mission at 167 River street, Cleveland, makes a remarkable showing of the excellent work done by this really commendable institution, which is under the direction of Chaplain Jones.

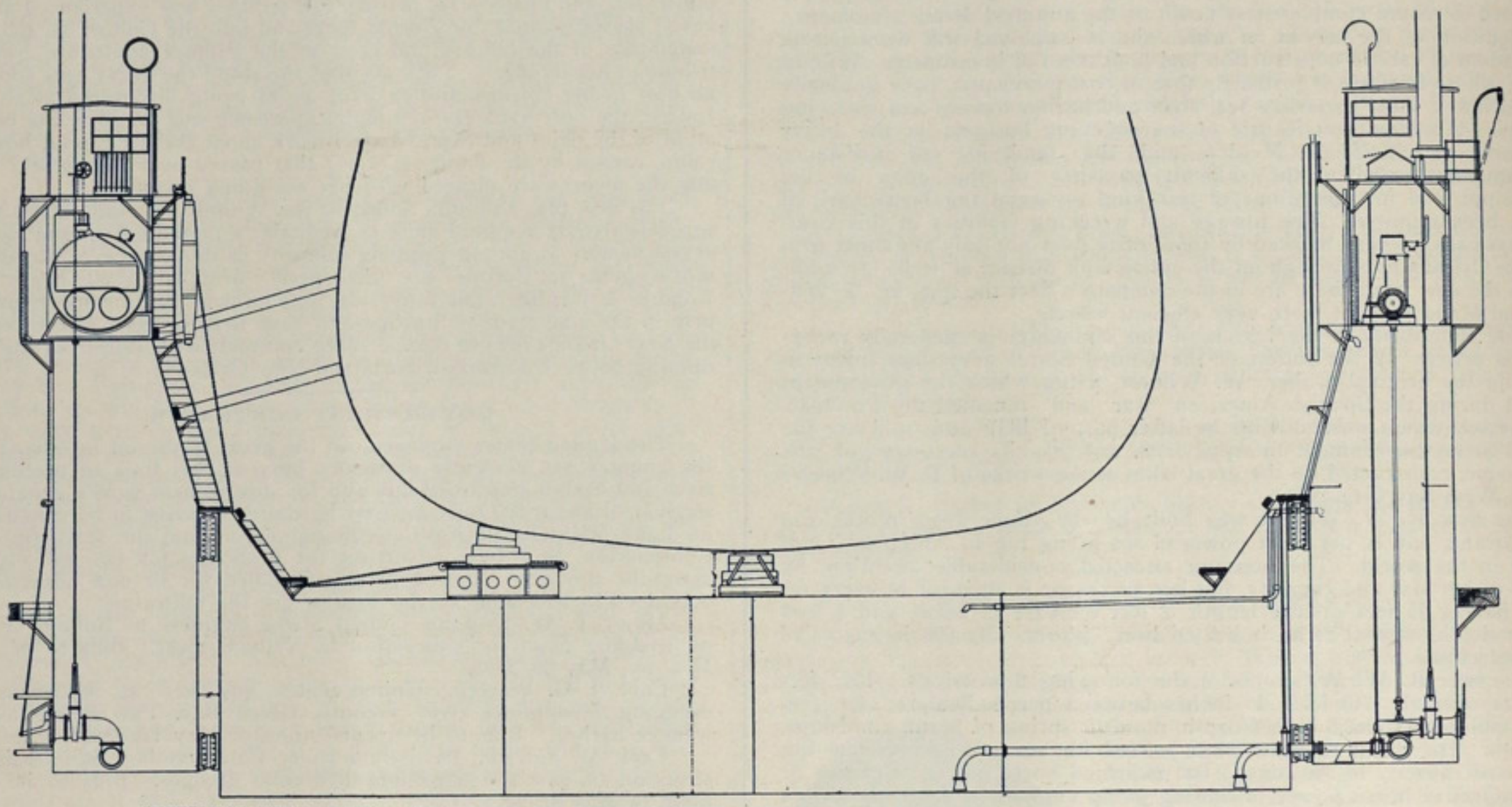


STEEL TOWING STEAMER "R..W. WILMOT," MOST POWERFUL TUG IN AMERICA. BUILT BY GLOBE IRON WORKS, CLEVELAND. AND JUST ADDED TO THE FLEET OF W. G. WILMOT & CO., COAL MERCHANTS OF NEW ORLEANS, LA

GREAT FLOATING DOCK.

THE STRUCTURE FOR WHICH THE UNITED STATES NAVY DEPARTMENT HAS JUST LET A CONTRACT TO THE MARYLAND STEEL CO. WILL EXCEED IN DIMENSIONS ANY FLOATING DOCK IN THE WORLD—DESIGNED BY CLARK & STANDFIELD OF LONDON, ENGLAND, WHO ALSO PLANNED THE HAVANA AND STETTIN DOCKS.

The Review takes pleasure in giving herewith the first presentation as yet made of the plans of what will be upon completion the largest floating dry dock in the world. The contract for this dock, which is to be stationed at Algiers, La., near the mouth of the Mississippi river, was awarded by the United States navy department a short time ago to the Maryland Steel Co. of Sparrow's Point, Md. upon plans prepared by Clark & Standfield, dock engineers of 14 Victoria street, London, England, the designers of the 10,000-ton dock at Havana and the 11,000-ton dock at Stettin, Germany. The Review is indebted to Mr. Joseph Beale of 808 Seventeenth street, N. W., Washington, D. C., the American representative of Clark & Standfield, for the drawings, which embody alterations as finally adopted.



SECTIONAL VIEW OF FLOATING DRY DOCK TO BE ERECTED FOR THE UNITED STATES NAVY DEPARTMENT AT ALGIERS, LA.

The new dock, which will lift any ship built or building, not even excepting the Oceanic, will be of the following dimensions: Length, 525 feet; breadth over all, 126 feet 3 inches; breadth between walls, 100 feet; depth of water over sill, 28 feet; draught of water required to sink the dock, 49 feet 6 inches; height of keel blocks, 4 feet; number of pontoons, three; length of middle pontoon, 242 feet; length of end pontoons, 141 feet; depth of pontoons, 17 feet 6 inches; free board of walls when the dock has 28 feet of water on the sill, 4 feet 9 inches; lifting power, 18,000 tons. The steam pumping plant which is in duplicate, is designed to lift 18,000 tons out of the water in 3½ hours. The moorings, designed for a 6-knot current and a maximum wind pressure of 30 pounds to the square inch, consist of two 2-inch chains upstream, each made fast to one or more single or tandem anchors of either the screw, mushroom or ordinary type. The dock will be connected with shore by two hinged swinging booms, fitted as gangways, and each capable of sustaining at any point on two wheels a load of 20 tons. These booms, 80 feet long, working like a pair of parallel rulers, permit the dock to swing close in shore by slackening the chains. A chain which crosses diagonally of these booms, prevents the dock from being blown up stream by the wind.

The stability of the dock under the most severe conditions will be enormous. The severe requirements of the United States navy department as to stiffness, both longitudinal (1 in 3,000) and transverse (1 in 1,800), have been amply met. The total weight of the dock and equipment will be 6,122 tons. Around the entire dock a timber waling of pine, 18 by 12 inches, will be worked at the level of the pontoon deck, with an extra ans similar waling at the bows, 5 inches below the first. The pontoons will have three longitudinal water-tight bulkheads and water-tight transverse bulkheads spaced every 10 inches. The pontoons will be secured to the walls by two parallel rows of fastenings, each consisting of a pair of T castings, fish plates and pins, spaced every 10 inches.

The dock, which will be an improvement over the Stettin dock but virtually of the same type, is to be located in the Mississippi river in front of the naval reservation at Algiers, La., in a situation with ample depth of water for its operation in docking a vessel of 28 feet draught at the lowest known stage of the Mississippi river at that point. The specification prepared by the United States navy department and upon which the contract was awarded, provide that the entire structure must be of steel, except the keel blocks, bilge blocks and shores, although if it is found necessary to place any portion of the accessory structures underneath the surface of the water, wood may be utilized in their construction. The contractors and designers were allowed their choice of steam, electric, hydraulic or pneumatic power, and as will be noted above selected steam. The specifications further stipulate that the dock proper is to have a transverse strength and stiffness sufficient for docking a battleship 450 feet long and of 15,000 tons, with her entire weight carried by the keel blocks and with two thirds of her weight concentrated in the middle half of her length. The dock must not careen more than 3 degrees under the most unfavorable conditions of loading, providing for the vessel landing 2 feet off the longitudinal center line. With a few exceptions all steel used will be acid or basic open hearth, with a maximum strength of from 55,000 to 70,000 pounds per square inch. The dock is to be completed in a little less than 18 months from this date. If there is any delay in the completion of the work a fine of $200 per day will be imposed. The contract, which was awarded to the Maryland Steel Co. Feb. 18, was formally signed April 10, the cost of the structure being some lower than the $850,000 authorized by act of congress, of which $200,000 was provided by the last naval appropriation bill. At the plant of the Maryland Co., Sparrow's Point, work is being actively pushed on the basin in which the dry dock will be built. A site for the basin has been selected in the water south of the present marine works, and the place is being dredged and piles driven. Above these piles will rest the hull of the dry dock. Earth will be placed around the piles forming a cofferdam, and the basin thus formed will only require pumping out before actual work on the dock proper begins. When the dock is completed water will be let into the basin and the dock floated.

CONSOLIDATION OF STEAMSHIP COMPANIES.

Plans undertaken some time ago for the consolidation of the North Shore Navigation Co. and the Great Northern Transit Co., Canadian lines, are progressing satisfactorily to both interests, and it is understood that all details of the new corporation, to be known as the Northern Navigation Co., Ltd., will soon be completed. The combined fleets will comprise five vessels, the City of Medland, Atlantic, City of Parry Sound, City of Toronto and City of London, for the service in Georgian bay between Collingwood, Ont., and Sault Ste. Marie, calling at all ports; and for Lake Superior service between Collingwood, Port Arthur and Duluth, the line will have the steamers Majestic and City of Collingwood. A new steamer, to be named the Germanic, is building at Collingwood and will be launched in July. The capital stock is being increased in order to allow of further development and improvement in the Lake Superior service.

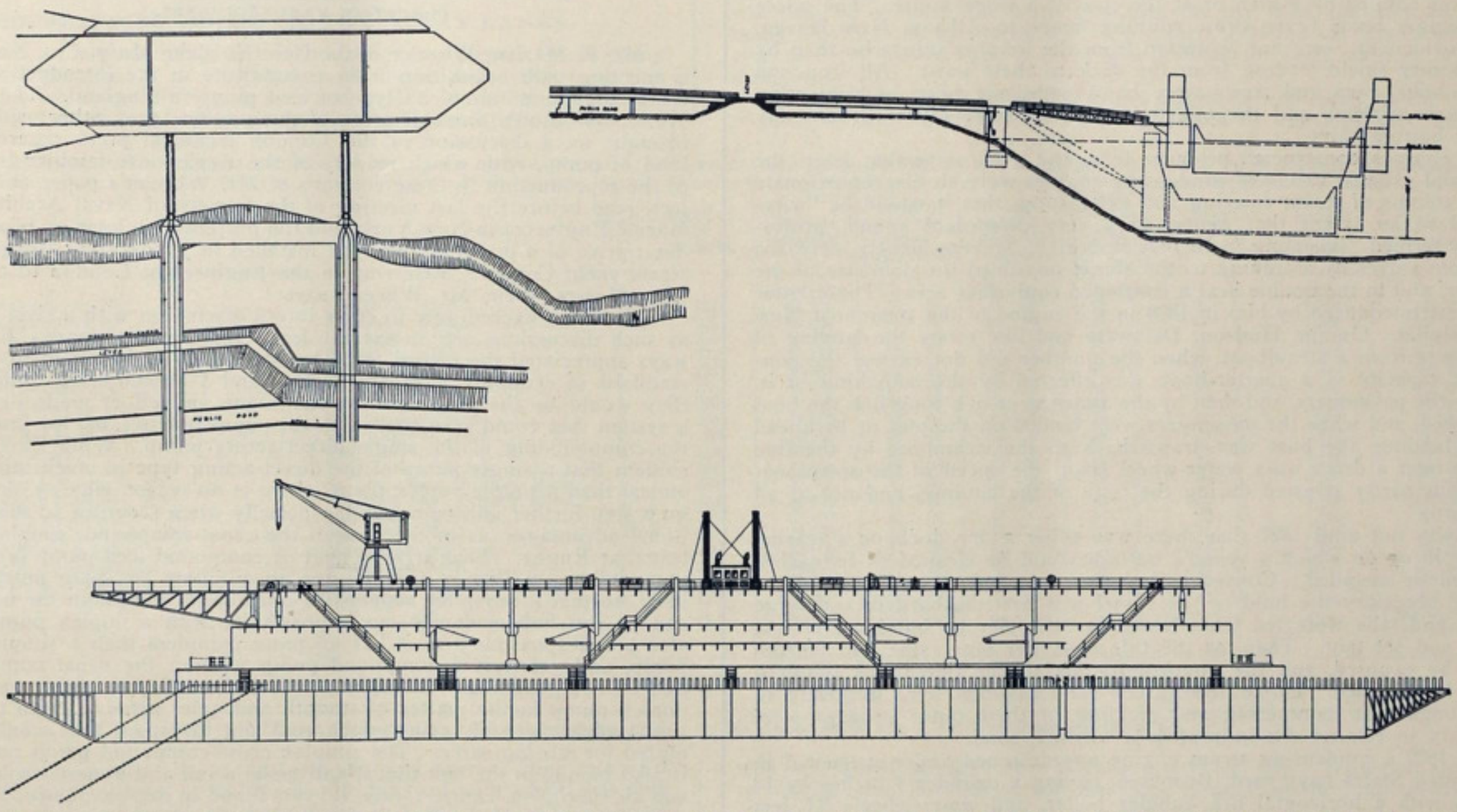
A number of the Chicago yachtsmen who reside near Jackson park are organizing a yacht club that will be known as the La Rabida club. They will have a club house in the south pond, near the old La Rabida convent of World's Fair memory. One of the crack cat boats of the fleet will be the Undine, owned by Mr. Charles B. Darling, western manager of the Army & Navy Register. The Undine is a cat boat built on modern lines by the Racine Boat Co. this year, is a center-board cabin boat of 24 feet length by 7½ feet beam, and has a spread of 340 feet of sail. A number of yachts of this class will be built by members of the La Rabida club the coming season. Nearly all of the members have been taking instructions in navigation from Prof. W. J. Wilson of the Chicago Nautical School.

Detroit is to have another fire boat to cost about $72,000. The present boat, the Detroiter, was built by the Craig Ship Building Co. of Toledo.

BRITISH VS. AMERICAN SHIP BUILDING.

LEADING REPRESENTATIVES OF THE INDUSTRY ON THE OTHER SIDE ADMIT ALARM OVER AMERICAN COMPETITION, NOTWITHSTANDING GREAT ACTIVITY AT PRESENT IN SHIP YARDS THROUGHOUT THE UNITED KINGDOM.

Quite a flurry has been created in British ship building circles by the remarks of Mr. J. Y. Short on the occasion of his recent re-election as chairman of the Sunderland Shipowners' Society. He began by quoting statistics showing how rapidly foreign shipping competition is advancing against Great Britain. He expressed surprise that the United States, the most progressive nation in the world, had ever allowed the supremacy of its merchant marine to decline, but impressed upon his confreres the fact that they might rest assured that the Americans would never be satisfied until it was restored. In 1850, he said, American vessels carried 75 per cent. of their country's products; in 1860, 65 per cent.; but today only 15 per cent., while the Americans are at present paying foreign ship owners $500,000 daily in freights on American goods. He followed up these reflections by the statement that had it not been for the introduction of iron and subsequently steel in ship building, the union jack would have been swept off the ocean by the stars and stripes. Finally he called attention to the boom in ship building in America which has resulted from cheap production of ship material and thought it probable



PLANS OF THE FLOATING DRY DOCK, DESIGNED BY CLARK & STANDFIELD, LONDON, ENG., AND BUILDING BY THE MARYLAND STEEL CO., SPARROW'S POINT, MD.

that the next generation might witness "a keen contest between British owners and the pushing and enterprising Yankees." Of course the Short address had caused all sorts of comment ranging from flippant to mournful. The general tenor of the technical press, however, seems to be a concession that America is the coming competitor in ship building and the ocean carrying trade, but that the present safeguard of the British is found in the fact that the American ship builder will not exert himself to the utmost until it is seen what the government will do in the way of bounties.

Meanwhile reports indicate a prosperous condition at present of British shipping and ship building interests. The launching of the Oceanic has restored Liverpool to its former position of being the home port of the largest ship afloat. The rumor that ere the Oceanic makes her maiden trip the keel will be laid for a still larger vessel continues to circulate persistently, and it would indeed be not surprising if before long two vessels, one German and one British, both larger than the Oceanic, will be found under construction. It is announced also that Harland & Wolff of Belfast, Ireland, builders of the Oceanic, have so many orders on hand that no more will be taken for delivery under five or six years. A company has been formed at Middlesbrough with a capital of $1,485,000 to make steel ship plates by a new and cheaper process, it is claimed, than the present method. The steel is to be made from Cleveland (north of England) pig iron, instead of hematite. Ship owners of Great Britain continue their agitation for greater encouragement by the government for the employment of boys who undertake to qualify themselves for the naval reserve. The only encouragement offered at present is in the form of an abatement of one-fifth of the light dues on certain terms to those ships which carry these boys. As the abatement of light dues will amount to only $5 per annum per boy, while it would cost from $80 to $100 per year to keep a boy, it can readily be seen that ship owners would not be gainers to any considerable extent by the operation.

Arrangements are being made at the works of the Chicago Ship Building Co. for the launch on Saturday next of the passenger steamer Illinois. This is the vessel building for the Northern Michigan Transportation Co.'s service on Lake Michigan.

GRAIN DISTRIBUTION COMMITTEE AT WORK.

Buffalo, April 18.—The joint committee on the distribution of grain cargoes in Buffalo harbor held its first meeting today and formulated a plan of operation. It was arranged to send out a blank to the agents of vessels at all lake ports where grain cargoes originate, asking them to wire the committee of the departure of cargoes for Buffalo, giving the name of vessel, grain as divided up, hatches and consignee. When the vessel arrives at destination she will find an elevator provided. The disposition of the cargo as to hatches must be known, as it is not safe to unload a vessel amidships first. Grain in the bow is usually taken out first. The plan is called ideal, though it may possibly be found that some snags will make their appearance. One member of the committee brings up the possible chance of the consignee turning the cargo or a part of it over to some one else while it is in transit. Cargoes are sometimes sold while on the way. It appears to be the idea of the committee that the consignee will not be allowed to upset the arrangement by anything that he may do. A second point raised by another member of the committee is pretty sure to come up and that is the practice of certain of the line companies that own elevators of rushing their own boats to the elevator out of turn. The Western Transit Co. is charged with having done a great deal of this and may wish to continue the practice. The member of the committee who mentioned this matter holds that the cargoes are in the custody of the committee till they are given an elevator and that the fact that the elevators are in the pool will prevent such a plain violation of the general arrangement. All vessel owners as such should be interested in the maintaining of the committee's authority over the cargoes. If this is not done the arrangement is worthless from the outset. It is believed that the plan will work, and if it does it is worth all the time and expense of the bill-of-lading agitation.

A remark made the other day by a vessel owner shows the strides that have been made in vessel building of late. Before Capt. Reid had done half his work on the Cayuga it was said that if she were raised she would be out of date. And now a vessel owner is saying the same thing of the Harlem, that was so lately the pride of the Western Transit Co. "Let her alone," he said. "She is only second class!" So there is but one first-class package-freight carrier on the lakes, the Troy. When the new Buffalo is finished there will be another. What is to be the end of all this?

Certain criticisms made regarding the use of the names Arkansas, Connecticut, Florida and Wyoming for the new monitors now under construction—from the standpoint that the names for states should be reserved for battleships—have called forth a letter from Secretary Long of the navy department, in which that official says that the use of names of this character was necessary, in view of the stipulations of the act authorizing the construction of these vessels. The selection of names for naval vessels authorized by the last congress has given general satisfaction. The battleships will be designated Pennsylvania, New Jersey and Georgia; the armored cruisers West Virginia, Nebraska, California; and the cruisers Denver, Des Moines, Chattanooga, Galveston, Tacoma and Cleveland.

Officials of the Morgan line, New York, have decided that the four steamers now building at the works of the Newport News Ship Building & Dry Dock Co. Newport News, Va., shall bear the same names as the vessels which they sold during the Spanish-American war to the United States government, and accordingly the names have been changed back from El Dia, El Alba, El Siglo and El Libre to El Sud, El Norte, El Sol and El Rio.

STEAMBOATS OF EARLY DAYS.

REMINISCENCES OF MARINE STEAM ENGINE CONSTRUCTION AND STEAM NAVIGATION IN THE UNITED STATES FROM 1807 TO 1850.

BY CHARLES H. HASWELL*

Having essayed in a previous paper to give some reminiscences of the construction and operation of early steam engines and of steam navigation in the United States, it is proper that any omissions in the recital given should be supplemented, in order that, as a record is undertaken, it should be made as full as knowledge and memory will permit.

John Stevens of Hoboken, N. J., applied the parallel motion, invented by James Watt of England in 1784, to guide the piston-rod of an overhead or beam engine in the steamboat Phoenix; in 1809 he patented slides and a crosshead to guide the piston-rod, and in 1817 his son, Robert L. Stevens, applied a cut-off to an engine by a camboard, and in 1825 he applied slides and a crosshead to the engine of the steamboat Trenton, connecting the crosshead to the beam by a rod with bifurcated ends; which design, a few years after, was improved by the use of two right-line rods, as now practised.

Ferry-boats up to 1821, when the steamboat Hoboken was built, were constructed with twin hulls, a water-wheel operating between them; and, with the exception of one boat on the North and one on the East river, New York, they were driven by horses, and up to 1829 were steered by a tiller directly, and, in the absence of an upper or awning deck, the helm was conned by a man or at the side of a wheel house. The pilots of passenger boats (even those running hence to Albany, New Haven, and Providence), were not protected from the weather otherwise than by a temporary shield leading from the deck to their waist. All iron and copper bolts, nuts and rivets were hand-made, the bilge and injection pipes were of lead, and the injection and discharge pipes without any side or bottom valve.

In engines constructed prior to 1824, and even somewhat later, the steam and exhaust valves of condensing engines were so disproportionate to the volume of steam entering and exhausting, that it would be "wire-drawn" to an extent that generated a very discordant sound, professionally termed "squealing." In 1822 Robert L. Stevens largely increased the steam valves by assigning to the single one-third the diameter of the cylinder, and to the double beat a combined equivalent area. These latter were first introduced by him in 1830 in the engine of the steamboat New Philadelphia. On the Hudson, Delaware and like rivers the landing of passengers from a steamboat, when the number did not exceed the convenient capacity of a quarter-boat, was effected by the launching of it, seating the passengers, and then by the attachment of a long line the boat was towed, and when the passengers were landed on the pier or bulkhead of the landing, the boat was drawn back to the steamboat by the line leading over a drum on a water-wheel shaft, the speed of the steamboat being but partly arrested during the time of the landing, and not at all afterwards.

It was not until 1827 that there was either a dry dock or a marine railway in or on which a vessel's bottom could be cleaned of barnacles, breamed or metalled. Consequently, when any one of such operations became necessary the hold of the vessel was first discharged, and large blocks and falls were led from her tops to a pier or bulkhead at low water, and set taut. Then, as the tide rose, her outer side and bottom would be exposed, and the opportunity for all the operations required would be afforded. Up to 1830, green sand castings were generally so very rough that hammering and pickling of their outer surfaces were necessary to remove the indurated or vitrified sand.

In 1837 a condensing steam engine was designed and constructed in the United States navy yard, Brooklyn, having a cylinder 4 inches by 12 inches, with a horizontal fire, tubular boiler, and water-wheels 3.5 feet in diameter by 8 inches face, which was put in the gig of a sloop of war lengthened to 35 feet, and this was the first successful essay of the practical application of a steam engine to a launch; speed 8.5 miles per hour.

In 1839 Francis B. Stevens of Hoboken, N. J., designed the cutting-off of steam by the addition of a second eccentric and rock shaft, and in 1840 successfully applied it to the steamboat Albany. This is illustrated in Engineering of London, issue of Feb. 18, 1898.

On May 20, 1842, Frederick E. Sickles of New York designed and patented an "apparatus for lifting and regulating the closing of the valves of steam engines" a cut-off, termed and known as the "drop valve." The design was that of disengaging the stem of the steam valve (when vertical) at any assigned point of expansion of the steam, and the operation, whilst effective, was primarily attended with the difficulty of the arrest of the valve in its descent under the pressure of the steam bearing upon it, and of the moderating of the resulting impact of it in its seat; it was gradually and finally effected by the operation of a small piston in a closed cylinder, the confined air in it acting as a cushion. So perfect was the operation of this instrument that in the construction of the engine of the U. S. S. Water Witch, the throttle valve in the steam pipe was dispensed with, as the cut-off could be operated even at the initial point of the stroke of the piston.

In 1842 Edwin A. Stevens of Hoboken, N. J., designed, patented and operated a closed fire-room in the steamboat Rainbow, supplied with air by a fan blower located externally, and in 1845 the system was introduced in the U. S. S. Mississippi. In 1842 Capt. John Ericsson designed the application of screw propeller blades to the sides of a steamboat, like to a side wheel with diagonal blades, operating them with two independent steam engines constructed for a high pressure and many revolutions. The result was not satisfactory, and the boilers were replaced with others of greater capacity, designed for a greater pressure. But the application of propeller blades was a disappointment; the engines and wheels were removed and replaced with an ordinary vertical beam engine and water-wheels with radial blades.

In 1844 zinc was for the first time laid in the bottom of a vessel—in the United States propeller Legare—with a view to arrest the oxidation of the plates by the consumption of the zinc, and so successfully did the application operate that in 1847 it was applied to the boilers of the U. S. S. Princeton. On July 24, 1844, Henry R. Worthington of New York designed and patented the independent steam, fire, and bilge pump (donkey), and in 1859 the duplex valve motor.

On July 22, 1846, Francis B. Stevens filed a caveat in the patent office at Washington embracing his design of projecting atmospheric air under the wetted surface of the bottom of a vessel in motion, to diminish that portion of the resistance of a vessel commonly termed the friction of the wetted surface. In 1847, after experiments were made on the Delaware and Raritan canal by towing models and boats by a locomotive running on a track at its edge, a joint patent for the design was obtained by Francis B. Stevens and his uncle, Robert L. Stevens, in the United States, England and France; and in 1848 and 1849 they designed and directed the construction of the steamboat John Neilson, to which the elements of the patent were applied. In operation the application increased the speed of the vessel. In 1848 Frederick E. Sickles designed the first application of a steam engine to the rudder of a vessel, and successfully introduced it in operation.

* This paper, read March 28, 1899, at the fortieth session of the Institution of Naval Architects, London, is a continuance of a paper on the same subject submitted at a previous meeting of the British institution and which was also printed in these columns. Mr. Charles Haswell was the first engineer-in-chief of the United States navy.

COMPOUND FEED PUMPS.

MR. F. M. WHEELER OF THE GEO. F. BLAKE MNFG. CO. IS CALLED UPON TO DEFEND HIS 'SIMPLEX" TYPE IN ENGLAND—CRITICISM FROM COMPETING MANUFACTURERS.

Mr. F. Meriam Wheeler of the Geo. F. Blake Mnfg. Co., New York, is meeting with opposition from competitors in the introduction of his cross-compound "simplex" type of feed pump in England. The Messrs. Weir, well-known manufacturers of pumps on the other side, have brought on a discussion in the London technical press regarding this kind of pump, with which readers of the Review are familiar by reason of the reproduction in these columns of Mr. Wheeler's paper on the subject, read before the last meeting of the Society of Naval Architects and Marine Engineers in New York, and the presentation later on of an article descriptive of a pump of this type installed in J. Pierpont Morgan's new steam yacht Corsair. Referring in the Engineer of London to criticisms from Messrs. Weir, Mr. Wheeler says:

"I dislike exceedingly to enter into a discussion with a rival concern, as such discussions are, to say the least, very unsatisfactory. I have always appreciated the record made by Messrs. Weir in trying to raise the standard of economy in steam pumps, and I should have thought that they would be the very ones to encourage any effort made to develop a system that could save coal in steam pump practice, as, for instance, in the compounding of the single direct-acting pump. While it is very evident that a single pump of the direct-acting type is much more economical than a simple duplex pump, there is no reason why we should not go a step further and compound, especially when securing so many additional advantages, as in the case of the cross-compound 'simplex' pump tested at Rugby. That arrangement of compound feed pump is certainly very unique, in that it provides for an auxiliary or spare pump within itself, so that if anything happens to one side of the pump the other side can be run independently—an impossibility with a duplex pump. It is also unique, inasmuch as it has no more cylinders than a simple duplex pump, and yet it is a compound pump without the usual complication due to compounding. In other words it has all the advantages of a duplex pump in the matter of smooth and quiet running, with the additional advantages of saving much coal and the space that would be required for storing same. The simplex cross-compound pump referred to is also unique in the fact that it will make a full and honest stroke at any and all speeds—a feature rarely, if ever, found in duplex pumps, and quite infrequent in single pumps of the direct-acting type.

"Now, the object of my paper, 'Economy Test of a Unique Form of Feed Pump,' was to bring out the economical advantages of compounding, as in the case of this unique form of feed pump for sea-going vessels, and for that reason I confined myself to the indicated power of the steam cylinders. I paid little or no attention to the test of the water end of the pump, for the simple reason that the pump was not actually feeding a boiler, but simply discharging from an open pipe, through a partially closed throttle valve—which meant more or less fluctuation of the water pressure, and therefore difficulty in the correct reading of the water pressure gauges. The water cylinders were not indicated. The steam cylinders were indicated by experts, and the condensed steam carefully weighed; while the power of the pump was quite small, and the steam supplied through a naked pipe, still the showing was remarkably good, namely, about one-half of what would be required by a duplex pump of the single type, and about two-thirds for a pump of the single type. With properly covered steam pipes and steam-jacketed cylinders, I have seen moderate size compound pumps of the single type give as good as 40 pounds weight of steam per indicated horse-power per hour when running compound condensing, while in the larger units the economy was as good as 35 pounds.

"Messrs. Weir speak of a single pump giving an economy as good as 62½ pounds, and this is quite possible under the most favorable conditions. I doubt very much whether such a showing could be secured in regular practice where the piston speed runs low, which means increased cylinder condensation; but even if such a showing was readily secured, it is very evident that the compound could do better by nearly 30 per cent. For reasons that are well known, we are able to secure greater economy by compounding a direct-acting pump than in the case of regular steam engines, and anything done to improve this system is a step in the right direction. As an illustration of what can be done by the compound system in every-day practice, I refer to the auxiliary pumps of the ferry boats Bremen, Hamburg and Netherlands, plying between New York and the city of Hoboken. These pumps, according to reports of Professor J. E. Denton and Colonel E. A. Stevens, performed their work with 40 pounds weight of steam per indicated horse-power per hour, the pumps running at a speed of 100 feet to 120 feet piston travel per minute, which they are able to do with perfect smoothness and quietness—a feature rarely found in ordinary direct-acting pumps of the single type.

"Regarding what Messrs. Weir have written about the low efficiency

of the water cylinders of the Blake cross-compound 'simplex' pumps tested at Rugby, I must say that the efficiency as shown was unsatisfactory, We have no trouble, however, in getting as high as 98 per cent. efficiency when the packing of our water pistons is properly adjusted. With ring packing as provided in these 'simplex' feed pumps, there is no reason why the slip should be over 2 or 3 per cent., except that the attendant has not paid proper attention to the adjustment of the water pistons. Our competitors seem to forget that the object of my paper was to show what could be done by compounding a steam pump in the manner described, and that the water end of the machine is simply a matter of detail.

"In speaking of the amount of coal that would be used on a steamer of 30,000 indicated horse-power—which is to be the engine capacity of the Oceanic—I think Messrs. Weir made a slip in saying that 30 tons of coal would supply the steam that would be taken by the pumps on a voyage of 5½ days. The records of tests on warships of different navies show that the average indicated horse power of feed pumps is about half of one per cent. of the indicated horse power of the engines. This would mean 150 indicated horse power for the feed pumps of the Oceanic. Now, assuming a pump economy as good as 62½ pounds, as suggested by Messrs. Weir, it would require nearly 70 tons of coal instead of 30 tons, as stated in their letter; this being based on a boiler evaporation of, say, 8 pounds of water per pound of coal.

"To sum up the whole matter, I feel that it is only a question of time when Messrs. Weir will come round to our way of thinking, and will be offering a compound pump sooner or later."

ORE SHIPPING DOCKS ON THE GREAT LAKES.

A very complete summary of information regarding all ore shipping docks on the great lakes is presented in the table that appears on this page, and for which tne Review is indebted to Mr. R. Angst, chief engineer of the Duluth & Iron Range Railroad. As shown by the table, there are twenty docks in all at the several ore shipping ports. They represent an expenditure of millions of dollars by the railroad companies that own them. The combined length of these docks is 27,813 feet, and they contain 4,529 pockets, capable of storing 672,966 gross tons of ore.

RECORD OF IRON ORE SHIPPING DOCKS ON THE GREAT LAKES, APRIL 1, 1899—PREPARED BY R. ANGST, CHIEF ENGINER DULUTH & IRON RANGE RAILROAD.

Railway.	Location.	Dock No.	Number of pockets.	Storage capacity.	Height, water to center hinge hole.	Height, water to deck of dock.	Width of dock outside to outside partition posts.	Length of Spouts.	Length of Dock.	Angle of pockets.
				Gross tons.	Ft. in.	Ft. in.	Ft. in.	Ft. in.	Ft.	
Chicago & Northwestern Ry	Escanaba, Mich	1	184	24,104	28 10	48 6	37 0	21 0	1,104	39° 30′
Chicago & Northwestern Ry	Escanaba, Mich	3 (a)	226	30,284	31 02	52 8	37 0	27 0	1,356	45° 00′
Chicago & Northwestern Ry	Escanaba, Mich	4	250	32,750	36 06	59 2	37 0	30 0	1,500	45° 00′
Chicago & Northwestern Ry	Escanaba, Mich	5	232	43,152	28 06	53 3	37 0	21 8	1,392	40° 00′
Chicago & Northwestern Ry	Ashland, Wis	1	234	36,036	32 10	54 0	46 8	27 0	1,404	39° 30′
Chicago & Northwestern Ry	Ashland, Wis	2	234	25,740	36 06	57 8	46 0	27 0	1,404	42° 00′
Duluth & Iron Range R. R	Two Harbors, Minn	1	200	40,400	35 05	59 6	49 0	27 0	1,388 (b)	38° 40′
Duluth & Iron Range R. R	Two Harbors, Minn	2	208	42,000	33 05	57 6	49 0	27 0	1,280	38° 40′
Duluth & Iron Range R. R	Two Harbors, Minn	3	90	16,000	28 10	52 0	49 0	20 0	572	38° 40′
Duluth & Iron Range R. R	Two Harbors, Minn	4	168	30,000	28 10	52 0	49 0	23 0	1,112	38° 40′
Duluth & Iron Range R. R	Two Harbors, Minn	5	168	33,000	30 00	54 6	49 0	25 0	1,112	38° 40′
Duluth, Missabe & Northern Ry	St. Louis Bay, Duluth, Minn.	1	384	57,600	30 00	53 0	52 0	27 9	2,336	45° 00′
Duluth, Missabe & Northern Ry	St. Louis Bay, Duluth, Minn.	2	384	69,120	32 00	57 6	52 0	27 9	2,336	45° 00′
Duluth, South Shore & Atlantic Ry	Marquette, Mich	1	270	27,000	25 00	45 0	40 0	20 4	1,700	39° 00′
Duluth, South Shore & Atlantic Ry	Marquette, Mich	3(c)	213	12,780	23 00	37 0	53 6	21 0	1,200	39° 00′
Duluth, South Shore & Atlantic Ry	Marquette, Mich	4	200	28,000	27 09	47 3	36 8	21 1	1,200	39° 45′
Lake Superior & Ishpeming Ry	Marquette, Mich	1	200	36,000	30 09	54 0	52 0	24 7	1,232	38° 40′
Duluth, Superior & Western Ry. (d)	Allouez Bay, Superior, Wis	1	250	40,500	32 00	57 0	49 8	27 2	1,525	45° 00′
Minneapolis, St. Paul & Sault Ste. Marie Ry	Gladstone, Mich	1	120	15,000	26 08	47 0	37 0	21 8	752	40° 00′
Wisconsin Central	Ashland, Wis	1	314	33,500	31 04	54 6	36 0	27 0	1,908	234′—42° 30′ 80′—50° 45′
Totals		20	4,529	672,966					27,813	

(a) No. 2 taken down Feb. 1898. (b) 312 feet single pockets, 1,076 feet double pockets. (c) No. 3 dock not in use. (d) Now Great Northern Ry.

BAD TANGLE OF VESSEL INTERESTS.

Events of the past few weeks have resulted in a pretty wide scatterment of the fleet of lake vessels originally chartered by the Atlantic Transportation Co. of New York City. Of some thirty or more vessels only the steamers Simon J. Murphy, Katahdin and Aragon have been finally retained on the original charter arrangement by the Atlantic company, or rather by the receivers of that corporation. The Thomas L. Parker has been secured by the Hughes tug line of New York, while the S. V. R. Watson is being operated by the Scully Towing Co. of New York. The barges Metacomet and J. H. Rutter, which are still with the fleet at Valleyfield on the St. Lawrence river, where they have been tied up since last autumn, have ben purchased by the New York, Ontario & Western Railroad Co., which will take them on down to the coast and will, it is understood, place them in service in the coal trade between Weehawken and Cornwall on the Hudson and Boston. The Mack-Becker vessels of Cleveland, consisting of the schooners Annie M. Ash, Becker and Wadena are being operated independently for the present, and will probably be sold, while the Iron State and Iron City—Detroit vessels—are in Boston harbor with no certainty as to what disposition will ultimately be made of them. The entire Gilchrist fleet of barges has been turned over for the time being to the Luckenbach Towing Co. of New York. The schooner Camden is on a marine railway at Pictou, N. S., while the J. C. Fitzpatrick is at Sidney and the David Wallace and Moonlight at Shelbourne, N. S. The four latter vessels are held for claims of greater or less amount. In the case of the David Wallace the claims will aggregate a considerable amount. This vessel, it will be remembered, was abandoned by her crew. There was nothing particularly wrong with her. A few men in a fishing smack found her floating at sea with nobody aboard, and they had no trouble in sailing her into port with their small vessel in tow. Now they are claiming half the appraised value of the ship on the score of certain salvage laws that are said to govern cases of this kind.

The latest announcement with reference to some ten or twelve of the barges held in the St. Lawrence is that the Donnelly Salvage & Wrecking Co. has libeled all of them on claims connected with the contract between that company and the Atlantic Transportation Co. for the transfer of the fleet through the St. Lawrence rapids.

NEW SCHEME FOR TRANSPORTING ORE.

Chicago, April 18.—One of the most curious schemes of transportation ever devised on the great lakes will be put into operation by the new South Chicago Furnace Co. at Irondale, on the Calumet river, with the opening of its plant in the early summer. The car ferries of the Michigan & Wisconsin railroad company will be utilized. The furnace company had a hard problem before it in getting ore to its plant, owing to the shallow water in the Calumet near Irondale. When the old Irondale plant was running several years ago, its supply of iron ore was brought in schooners, but with the steadily decreasing cost of transportation with the coming of larger ships, the use of schooners was out of the question. The iron ore must be carried as cheaply to the new furnace company as to the great Federal Steel Co. located at the mouth of the Calumet river. But there was 20 feet of water to the Federal Steel Company and but 10 feet at Irondale.

As a solution of this problem the South Chicago Furnace Co. has chartered two car ferries, which will be put into the traffic of bringing iron ore from Escanaba at the opening of navigation. The ore will be piled in a pyramid on the decks of the ferries, the tracks remaining as they are. All that will be done will be to put in heavy braces to the sides and to the decks, which will be planked over to the height of the railroad tracks. On arriving at Irondale, cars will be run on board the ferries and the ore will be loaded directly into them by Pabst loaders. The cars will then be switched into the plant of the furnace company and unloaded. The heavy expense of labor in unloading iron ore from the holds of ships will thus be avoided, the work of lifting the ore from the deck to cars being mostly done by machinery. On return trips the car ferries will be able to carry loaded cars, if there is a demand for their services in that direction.

It is estimated that 2,500 tons of ore can be stowed easily on the decks of these ferries. With two ferries being towed by one tug, 5,000 tons of iron ore can be brought from Escanaba at every trip. With that amount of ore on board the ferries will not draw more than the limit of draft at Irondale.

This charter to the furnace company leaves the Michigan & Wisconsin railroad two ferries to be engaged in its general freight business, but they may be called upon if traffic is light to aid in bringing a stock of ore. The ferries have carried 1,800 tons and passed through severe storms. It is thought that they will be entirely seaworthy with 2,500 tons of ore, which will be stored much lower than freight on board cars, adding greatly to their stability in a seaway.

"It is possible that the new owners of the Irondale works," said a vessel man today, "have solved the problem for cheap transportation of iron ore on short routes, where the cost of handling is now so heavy in proportion to the cost of actually carrying freight. It seems to me that the handling of ore in this way is going to reduce the cost to the lowest possible degree. The only possible objection I can find is that the ferries might not stand up well in a big storm with so much weight on deck, but their experiences during the gales last fall tend to convince me that even this objection is not well-founded."

ACTIVITY IN BALTIMORE SHIP YARDS.

The present activity at the various ship yards in the vicinity of Baltimore, Md., is unprecedented. The plant of the Maryland Steel Co. is one of the busiest. Keels for the three torpedo boats to be constructed for the United States government will not be laid for some time, but much of the material is already on hand and considerable work has been done on machinery and fittings. The indications are that the sea-going tug building for the Baker-Whitely Coal Co. will be ready to go into commission this summer. The engine castings have been made and the boilers are nearly completed. The keel of one of the steam colliers for the Boston Towboat Co. has been laid and the other will follow in a few days. The passenger steamer for the New York and New Haven route is about half plated and will be completed Sept. 1. At the Columbian Iron Works the submarine torpedo boat of the Holland type building for the United States government is nearing completion. Repair work at this yard this year has been very heavy, the British ships docked and repaired having included the Admiral Nelson, Venango, King Bleddyn, Patapsco, Forest Brook, Forest Castle, Planet, Mercury, Mary Anning and others. Charles Reeder & Son expect to complete in June or July the steamer which they are building for the Queen Anne Railroad Co. Among recent repair work at the plant of the Campbell & Zell Co. was the overhauling of the police steamer Lannan and the refitting of the United States coast survey steamers Blake and Bache, preliminary to their Porto Ricoan service.

WELDED BOILER TUBES.

AS A RESULT OF TESTIMONY SUBMITTED AT THE INVESTIGATION OF ACCIDENTS ON THE BRITISH CRUISER TERRIBLE, A RECOMMENDATION IS MADE THAT THE ADMIRALTY DISCONTINUE THEIR USE.

In this country where seamless drawn steel boiler tubes have for some time past been used in both naval and merchant vessels especial interest attaches to the findings of the coroner's inquest on the death of a stoker, scalded to death in one of several recent accidents in the boiler room of the British cruiser Terrible. Assistant Engineer Harold Squire Morley, who was in charge of the stoke room at the time of the accident, testified at the inquest that the general opinion was that the mishaps to tubes in the case of this and other accidents was due to deterioration of the metal. The tube that burst was of the welded type, and he testified that in his opinion solid drawn tubes last much longer. Other testimony was in support of this theory, and the jury in its verdict, while exonerating the officers of the vessel, recommended that the admiralty discontinue the use of welded tubes.

The first accident resulted from the bursting of one of the tubes of a Belleville boiler and two men were scalded. The second accident occurred just as a stoker had opened a furnace door to ascertain the cause of some trouble, and the explosion which followed, together with the escaping steam and water, blew the fire out into the stokehold. The repeated accidents so unnerved the stokers that it was with the greatest difficulty that they were induced to continue to fire the furnaces. It is also alleged that several additional explosions occurred afterward, but owing to furnace doors being closed no one was injured. Many of the engine room artificers on the Terrible complained bitterly by reason of the fact that they were compelled to work thirty-six hours at a stretch repairing defects. These explosions are attributed by some to defective feed water arrangements in consequence of which a tube became overheated and burst. Others believe that the accidents were due to defective condensers allowing salt water to find its way into the tubes, which gradually became encrusted with salt. There are forty-eight boilers in the Terrible and three were disabled. It is a significant fact, too, that the accident occurred when the vessel was traveling at a slow rate of speed, between 13 and 14 knots. The pressure on the boiler was therefore not heavy, being estimated at 180 pounds, whereas the boilers are calculated to stand 260 pounds.

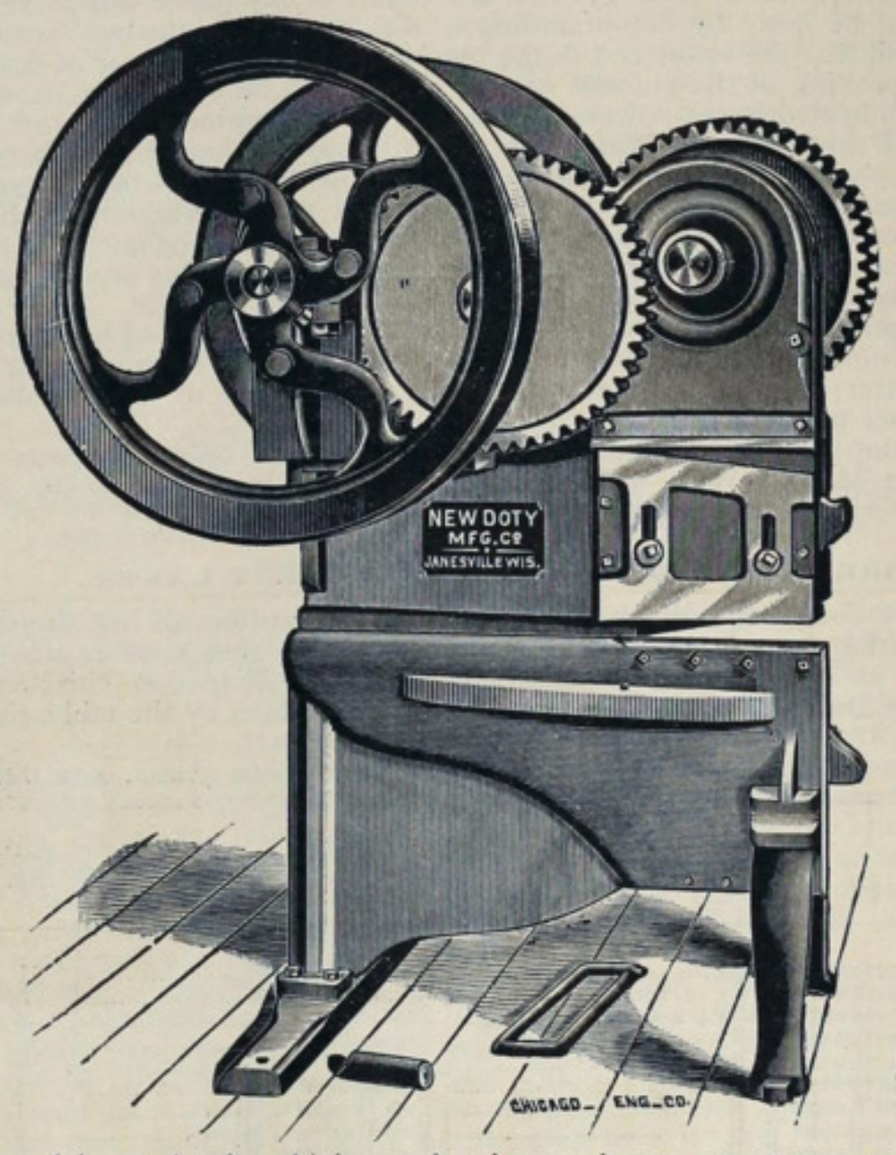
This same trouble was looked for here, and the United States navy department in recent contracts for twenty-eight torpedo boats and destroyers, three battleships and three monitors, specified seamless drawn steel tubes for all boilers. Moreover Engineer in Chief Melville of the United States navy in his recently issued report says: "Seamless drawn steel boiler tubes have been furnished during the year for all classes of our boilers of a degree of excellence undreamed of a few years ago, and in consequence the lapwelded tube makers have been compelled to correspondingly improve their product in material and workmanship." The Shelby Steel Tube Co. of Cleveland is the pioneer in the manufacture of seamless steel tubes in this country and has since 1892 furnished large quantities of these tubes for various types of boilers. Those furnished by this company to the United States navy department are of the highest grade obtainable.

It is expected that the steamer Globe, just sold to the Bessemer steamship Co. (John D. Rockefeller) by the Globe Iron Works Co. of Cleveland, will carry close to 5,000 gross tons when the work of lengthening her 72 feet is completed. The vessel will be ready to go into commission shortly. The Bessemer company pays $210,000 cash for the Globe, but in taking her they have stipulated that she is to be made considerably stronger in several particulars than was first intended. She is to have 15-inch 40-pound longitudinal stringers, running full length under the deck and alongside the hatches. Coal bunkers are to be enlarged and made of steel and hawse pipes are to be provided for two 3,000-pound stockless anchors. The Globe will undoubtedly make a very good towing steamer for the Bessemer company.

Michigan is to have another charcoal iron furnace of about 125 to 150 tons daily capacity. It will be located at Munising, near Marquette, and will be owned by interests controlling the Munising Co., a land and timber corporation, and the Munising Railway Co., which operates a timber road in connection with the land company. The furnace organization, made up in the office of Harvey H. Brown & Co. of Cleveland, a few days ago, will be known as the Munising Furnace Co. The furnace will be built at once. Officers named in the temporary organization are: W. H. Hinkle of the Ashland Iron & Steel Co., Ashland, Wis., president; D. B. Chambers, secretary; N. B. Bubb of Williamsport, Pa., treasurer; R. J. Gaffney of Bradford, Pa., manager.

CONTINUOUS SHEARS.

The shear illustrated herewith is made by the New Doty Manufacturing Co., Janesville, Wis., and is of the continuous kind, that is it will cut sheets any width or any length. It is made in four sizes with capacities varying from the lightest sheets to ¾-inch plates. These machines are very strong and powerful and do their work easily. All shafts and bolts are of steel and they are well made throughout. They are started and



stopped by a clutch, which can be thrown in or out at any point of the stroke. Special knives may also be arranged for cutting angle-iron or other shapes. The machines are double back geared, thus giving them great power, and the motion of the knives is such that in ordinary work they will cut every stroke. An adjustable hold-on prevents the sheet from tilting or from being cut. The New Doty company has sold a large number of these shears and they are giving general satisfaction. They are known as the 3 B type.

Lieutenant Wilson of the Chicago Nautical school has announced the winners of the prizes at the annual examination of pupils in the Masonic Temple. For the prize of $40 in gold offered to erudite captains Harry Pedersen and Samuel Thurston were tied, and agreed to divide first and second prizes between them, giving each $30 in gold. The other awards made were: Second prize for captains, $20 in gold, John F. Hansen; first prize for mates, $40 in gold, Edward S. Pickell; second prize for mates, $20 in gold, James Martin, Edward Kohnert and Mark Crowley. Twenty candidates competed for the prizes.

M. M. Sullivan of Toledo is building a dredge that will be one of the largest in the United States. It will be 110 feet in length, 38 feet beam and 12 feet deep. The machinery will have a capacity of 5,000 yards of earth per day. The lifting power of the main engine will be 140,000 pounds. The boiler, which has been built by Johnston Bros. of Ferrysburg, Mich., has a working pressure of 125 pounds.

A visit to the national capital may be enjoyed without extra cost for fare in going to Philadelphia and New York over Pennsylvania short lines. Tickets to those points via Washington may be obtained at same fares as apply over Pennsylvania direct lines, and will be good for ten days' sojourn at the national capital. For particular information apply to Pennsylvania lines ticket agents or address C. L. Kimball, assistant general passenger agent, Cleveland.

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REORGANIZED COURSE OF INSTRUCTION AT ANNAPOLIS.

According to present indications a complete reorganization of the course of instruction at the Naval Academy will have to be made, as a result of the amalgamation of the line and engineers under the personnel act, and through which it becomes necessary to abandon the present method of educating cadets in special lines for the engineer corps. In carrying out the reorganization plan, officers apprehend that, instead of advancing and extending the scope of instruction at Annapolis, it will be modified to such a degree as to seriously threaten its value in some of the most important branches. The necessity for maintaining at sea more than the usual number of line officers and the great demand for their services in other branches of naval work prevents the department from allowing the Naval Academy a full staff of instructors, and a limit has been fixed which will, it is believed, prevent as thorough work as should be expected of the institution.

Rear Admiral McNair, the superintendent of the academy, has been notified that there must be a reduction in the number of officers detailed to the academy, owing to great pressure upon the department to provide ships with their necessary complements. To meet this it now becomes necessary to merge several of the most important courses under one head and reduce the number of instructors. The departments of navigation and seamanship, formerly separate and distinct, will be consolidated, with two details of instructors. The departments of mechanics and steam engineering are also to be merged, and thus one of the leading departments will be weakened by having additional studies imposed on it and at the same time placed in charge of one head. The chief of this department will be an engineer officer, who will be expected to direct the course in mechanics as well. Applied mathematics and simple mathematics are also likely to be merged, and it is intended further to unite the departments of history and law with that of foreign languages. The whole procedure is opposed by naval officers, but directions have been issued by the navigation bureau which controls the academy, for a complete reorganization in the present method of instruction and a new distribution of studies.

A chart just issued from the hydrographic office gives the dates of the opening and closing of navigation, or rather the extent of the season, at the head of the lakes as follows: From April 11, 1889, to Jan. 12, 1890; April 2, 1890, to Feb. 2, 1891; April 30, 1891, to Feb. 13, 1892; April 20, 1892, to Dec. 26, 1892; May 9, 1893, to Dec. 10, 1893; April 16, 1894, to Dec. 26, 1894; April 11, 1895, to Feb. 1, 1896; April 12, 1896, to Dec. 18, 1896; April 17, 1897, to Dec. 15, 1897; March 19, 1898, to Dec. 23, 1898.

Ten days stop-over at Washington—Tickets to Philadelphia and New York over Pennsylvania short lines may be obtained via Washington, and good for a ten days' visit at the national capital, at the same fare as apply to Philadelphia and New York over direct lines of Pennsylvania system. For further particulars apply to Pennsylvania lines ticket agents or address C. L. Kimball, passenger agent, Cleveland, O.

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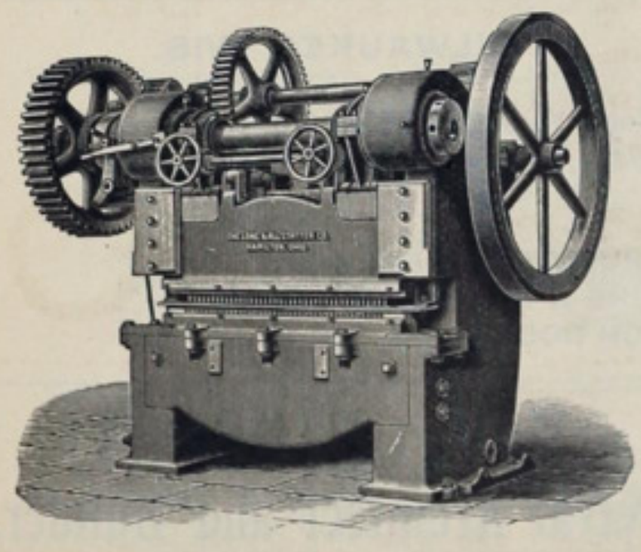
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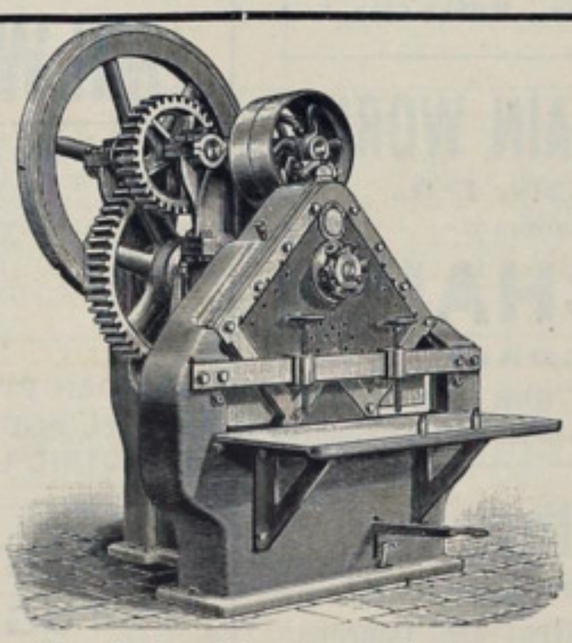
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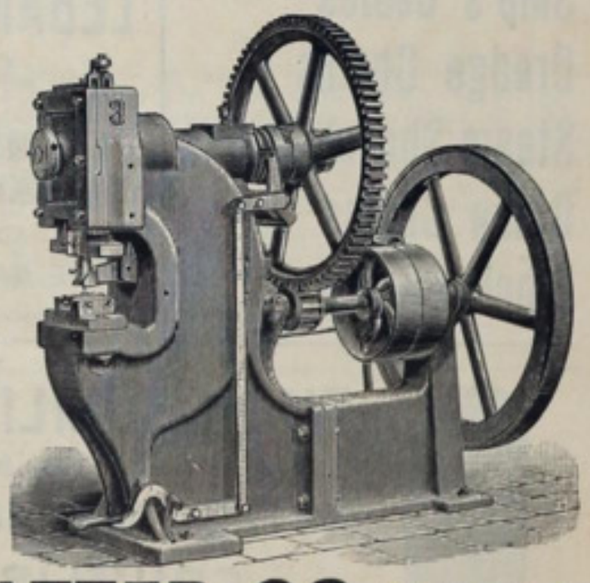
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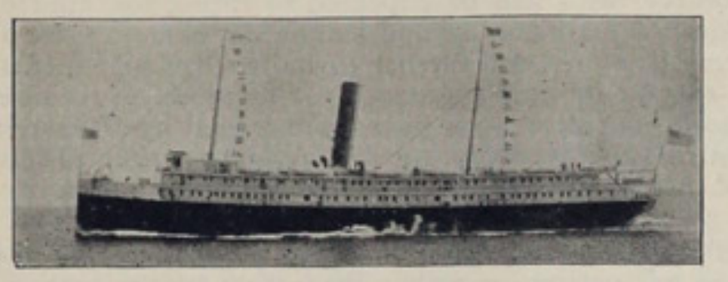

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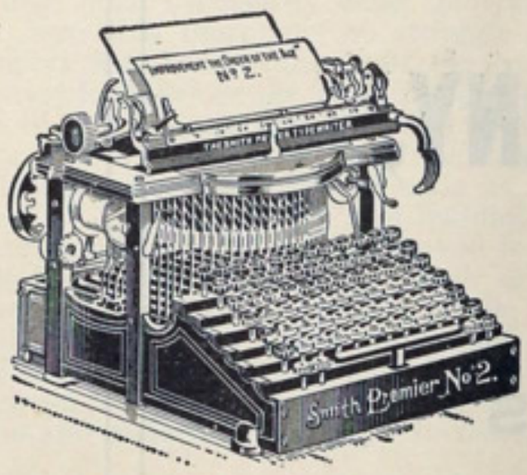

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UNITED STATES Engineer Office, 1637 Indiana Ave., Chicago, Ill., March 31, 1899. Sealed proposals for constructing thirteen miles, or less, of Feeder of Illinois and Mississippi Canal, from mile 17 to mile 29, south of Tampico, Ill., will be received here until 12, noon, central time, May 9, 1899, and then publicly opened. Information furnished on application here, or to Assistant Engineer L. L. Wheeler, Sterling, Ill. W. L. Marshall, Maj. Engrs. May 6.

Sealed proposals will be received at the office of the Light House Engineer, Milwaukee, Wis., until 3 o'clock p. m., May 12, 1899, and then opened, for the services of a steam barge or steamer of about 500 tons freight capacity for general service as a Light House tender for the Ninth District for the season of 1899. Specifications, form of proposal and other information may be obtained upon application to J. G. Warren, Capt., Corps of Engrs., U. S. A. April 27.

PROPOSALS FOR DREDGES.—Mississippi River Commission, Fullerton Building, St. Louis, Mo., April 19, 1899.—Sealed proposals, in triplicate, for construction and delivery of two self-propelling hydraulic dredges complete with machinery, cabin, outfit, etc., will be received here until 12 o'clock noon, standard time, May 31, 1899, and then publicly opened. Information furnished on application. Mason M. Patrick, Capt., Engrs, Sec'y. May 25.

U. S. Engineer Office, D. S. Morgan Building, Buffalo, N. Y., April 1, 1899. Sealed proposals for hire of dredging plant for excavation in Niagara River will be received here until 11 o'clock a. m., May 20, 1899, and then opened. Information furnished on application. T. W. Symons, Major, Engrs. May 11.

U. S. Engineer Office, 57 Park St., Grand Rapids, Mich., April 19, 1899. Sealed proposals for repairing government pier at Saint Joseph, Mich., will be received here until 3 p. m., May 19, 1899, and then publicly opened. Information furnished on application. Chester Harding, Capt., Engrs. May 11.

U. S. Engineer Office, Milwaukee, Wis., April 10, 1899. Sealed proposals for dredging at: Menominee River, Oconto, Green Bay, Two Rivers, and Milwaukee harbors, will be received here until 12 o'clock noon, standard time, May 17, 1899, and then publicly opened. Information furnished on application. J. G. Warren, Capt., Engrs. May 11.

SEALED proposals for furnishing about twenty-four thousand tons of armor for naval vessels will be received at the Navy Department until 12 o'clock, noon, Wednesday, May 31, 1899, when they will be publicly opened. Forms of proposal and all information may be obtained from the Chief of the Bureau of Ordnance, Navy Department, Washington, D. C. Chas. H. Allen, Acting Secretary. 3-29-99—May 11

U. S. Engineer Office, D. S. Morgan Building, Buffalo, N. Y., March 29, 1899. Sealed proposals for Construction of Concrete Superstructure on Breakwater at Buffalo Harbor, N. Y., will be received here until 11 o'clock A. M., May 10, 1899, and then opened. Information furnished on application. T. W. SYMONS, Major Engrs. May 4

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